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EDITORIAL

ANTIBIOTICS—THE NEW WEAPON IN TUBERCULOSIS

Since the discovery of the tubercle bacillus by Koch in 1882, repeated and persistent efforts have been made to find a drug or antibiotic that would be effective in the cure of tuberculosis. Men of science in almost every nation of the world have worked through lifetimes to find a lethal agent to defeat a germ that has consistently resisted every attempt against its predatory existence. Over the years, the hopes of the ill have been lifted by such attempts at treatment as tuberculin injections, gold therapy, the application of sulpha drugs, and various vaccines. In every instance the high hopes were dashed by failure. Although investigations continued, few drug cures for tuberculosis were offered until very recently, when Waksman isolated a promising compound—streptomycin—from certain species of the soil actinomycetes. Streptomycin has forged ahead, and, in laboratory and animal trials, has become the current drug of promise. At the moment, streptomycin is being tried on human beings and, although no extensive controlled experiments have been performed, preliminary results not only give hope of suppressive action, even in meningitis and miliary tuberculosis, but also point the way to further investigation and search for similar antibiotics that may be even safer and more economical.

It should be pointed out that penicillin, although not effective against tuberculosis, has been largely responsible for vigorous research into antibacterial substances in the soil. Here, indeed, is a vast field for scientific effort and ingenuity. Individual workers and teams of scientists should apply their separate and collective talents to this field, where the deadly enemy of the tubercle bacilli may be lying, not too obscurely, in hiding.

This is the eleventh of a series of special issues of PUBLIC HEALTH REPORTS devoted exclusively to tuberculosis control, which will appear the first week of each month. The series began with the Mar. 1, 1946 issue. The articles in these special issues are reprinted as extracts from the PUBLIC HEALTH REPORTS. Effective with the July 5 issue, these extracts may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., for 10 cents a single copy. Subscriptions are obtainable at $1.00 per year; $1.25 foreign.

Thus far, in the field of vaccine therapy, only BCG vaccine has proved to be an effective adjunct to conventional tuberculosis control methods. Such application, however, is limited to uninfected persons, and there are still objections to the use of live vaccine in the United States. BCG has been found to be beneficial as a control measure particularly in the Scandinavian and South American countries, and when its effectiveness can be prolonged, and killed organisms employed, it will be even more important in control, especially where exposure rates are high and treatment facilities poor.

The central problem still remains. We must discover a specific drug or antibiotic that will prevent and cure tuberculosis. However, we must observe certain precautions and take guarded care every step of the way. Moreover, the drug that eventually will be used should properly have definite characteristics, because tuberculosis is a long-term disease and repeated dosage of any drug will probably be necessary. Any drug ultimately used must be reasonable in cost, abundant in nature, or susceptible to simple and economical manufacture. Purity of the drug will need to be carefully determined. Recent studies with penicillin have demonstrated many variants of low potency. Development of resistant strains of tubercle bacilli must be watched for, especially in a disease which requires long periods of treatment during which the disease organism may achieve tolerance for the drug.

It should be kept in mind that any antibiotic, even though effective against the tubercle bacilli, may be of little benefit to far-advanced cases, because irreversible processes have set in and, in most instances, the blood supply to areas of cavitation and other areas with extensive involvement has been cut off. The drug, therefore, cannot be carried to those areas and may only prevent spread in surrounding tissues. For this reason, we must not expect too much of any drug, no matter how effective it may be in early cases of tuberculosis.

To be wholly effective, we must couple the use of an antibiotic with sound case-finding techniques, so as to discover early cases and to treat them at once. In this connection, additional research should go forward to discover some laboratory method, such as a complement-fixation test, for the diagnosis of tuberculosis when careful search does not reveal positive bacillary findings although the tuberculin test and X-ray findings are positive. Since many chest lesions are nontuberculous, such a laboratory method would be an essential companion to an antibiotic.

Often in the past, in the treatment of tuberculosis, promising drugs have been applied prematurely to human beings. It should continue to be the practice to subject any substance to exhaustive test-tube and animal experimentation and to make careful trials of its safety

and effectiveness, before controlled studies on human beings are undertaken.

The leading article in this issue, "A Crystalline Antibacterial Substance from the Lichen *Ramalina reticulata*," is another example of the careful laboratory and animal work that so much needs to be done in this field. It is hoped that from such beginnings, work of widespread scope will be undertaken on animals and, if justified, on human beings later. It is through such studies as this that one by one the antibacterial possibilities in tuberculosis are tested. Cumulatively, such research enterprise creates a decisive weapon for the final victory over tuberculosis.

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A CRYSTALLINE ANTIBACTERIAL SUBSTANCE FROM THE LICHEN *RAMALINA RETICULATA*

By ALFRED MARSHAK Ph. D., *Biochemist*[1]

Ramalina reticulata (Noedh.) Kremph., sometimes called California Spanish moss, is a lichen of the Family Usneaceae which grows as an epiphyte along the west coast of North America from California to Alaska (*1*). The plant has no integument but does contain in the interstices between hyphae and algal cells a carbohydrate substance which is very hygroscopic, so that under foggy conditions it is soft, friable, and saturated with water. During the foggy season, the plant may remain water-soaked for long periods of time. The carbohydrate, when separated from the plant, is an excellent medium for the growth of many types of bacteria. These conditions suggest the presence of a chemical substance in the lichen which inhibits the growth of bacteria.

A few simple observations were made which supported this inference:

1. By boiling the lichen in water and then cooling, a gelatinous carbohydrate material was obtained. A suspension of this material in sterile water was exposed to air and was found, in a few days, to be teeming with bacteria.

2. When strands of fresh lichen were placed on nutrient agar with sterile forceps and incubated at 25° C., no bacterial colonies were found, although occasional fungi of several types grew out from the surface or ends of the strands.

3. Agar plates were seeded with *Sarcina lutea* and incubated for 2 days at 25° C., so that bacterial growth was obvious. Lichen

[1] From the Field Studies Section, Tuberculosis Control Division. This work carried out at the Hopkins Marine Station and the Rockefeller Institute for Medical Research.

strands were then placed on the agar surface and the plates again incubated. Clear areas, which expanded as incubation time increased, appeared about the strands.

4. The lichen was spread over a layer of wet Norite A, exposed to north light for 3 or 4 days, and moistened with a fine spray each day. The Norite was then eluted with acetone-alcohol and the eluate, after removal of the acetone and alcohol, was found to have antibacterial activity against *Sarcina* and against several strains of soil mycobacteria. On fractionating the eluate, the antibacterial activity was found in the fraction soluble in petroleum ether. Other fractions which appeared to have activity lost it when neutralized.

HISTORICAL BACKGROUND

A great variety of compounds, many of them crystalline, have been isolated from lichens (*2*, *3*). Zopf has described "ramalinsaure" ($C_{18}H_{14}O_9$) isolated from *Ramalina farinacea* (L) Ach. and "ramalsaure" ($C_{17}H_{16}O_7$) from *Ramalina pollinaris*. Koller and Krakauer (*4*) determined the structural formula of "cetrarsaure" ($C_{20}H_{18}O_9$), previously isolated in crystalline form by Zopf from *Cetraria islandica* (L) and *Cladina rangeferina* (L), and found it to be a xanthydrol. Diploicin was also isolated by Zopf from *Buellia canescens* (Dicks). Its composition ($C_{16}H_{11}O_5Cl_3$) and structure were determined by Nolan and his co-workers (*5*, *6*, *7*) who found it to be a diphenyl ether. They also found gangaleoidin ($C_{18}H_{14}O_7Cl_2$) obtained from *Leconora gangaleoides* to have a similar structure. Barry (*8*) found diploicin to be active against *Mycobacterium tuberculosis* and *Corynebacterium diphtherae mitis* in dilutions as low as 1:100,000. He attributed the activity to the halogenated phenyl ether structure of this compound and drew analogies with thyroxin and other phenyl ethers. Hogeboom and Craig (*9*) isolated two crystalline compounds from *Aspergillus ustus*, $C_{21}H_{17}O_6Cl_3$ (m. p. 185–187° C.) and $C_{21}H_{18}Cl_2O_6$ (m. p. 214–216° C.), which inhibited growth of *Mycobacterium ranae* at dilutions of 1:300,000 and 1:100,000, respectively. They found a second isolate, to which they attributed the formula $C_{21}H_{18}Cl_2O_6$ (m. p. 214–216° C.). Doering and coworkers (*10*) isolated three chlorine-containing compounds from the same source, one of which they called ustin and considered identical with the substance (m. p. 185–187° C.) of Hogeboom and Craig, but they assigned to it the formula $C_{19}H_{15}O_5Cl_3$. Because of the rarity of chlorinated compounds from biological sources, it is interesting to note the similarity in composition of products isolated from such apparently different sources as the lichens *Buellia* and *Lecanora* and the fungus *Aspergillus*. Since the fungal components of the lichens belong to the same family as *Aspergillus*, i. e., Ascomycetes, the similarity may be more than a

coincidence. Burkholder and Evans (*11*) tested a hundred species of lichen against *Bacillus subtilis* and *Sarcina aurea*, by placing the plants in Oxford cups, and found that 52 species inhibited growth of one of these bacteria. They found that gram-negative bacteria were generally not inhibited. Weld (*12*) obtained an antibacterial extract from the eastern Spanish moss *Tillandsia usneoides* (*Dendropogon usneoides* (*1*) Raf.)[2]

METHODS OF EXTRACTION

Method 1.—The lichen was extracted by boiling for 4 hours with acetone (2 parts) and alcohol (1 part). The extract was filtered and, after standing at room temperature with slow evaporation for a week, a copious green precipitate appeared which was filtered off.[3] The precipitate was dissolved in boiling acetone and filtered while hot. On cooling, yellow needlelike crystals appeared. The green mother liquor was decanted and the crystals washed with alcohol and acetone. They were again dissolved (the solution was now yellow), recrystallized, and washed. This process was repeated three times. With slow crystallization, crystals as long as one inch could be obtained.

Method 2.—Preliminary trial showed that with larger volumes of acetone or acetone-alcohol, cold extraction gave good yields. The cleaned lichen was packed in 6-gallon earthenware crocks and covered with acetone-alcohol (approximately 10 lb. of lichen to 60 lb. of acetone-alcohol). After standing overnight, the yellow-green solution was decanted, filtered, and poured into enamelware pans. The pans were put outdoors, protected against direct sunlight. In a brisk breeze evaporation proceeded rapidly, and in a few hours a copious green precipitate appeared and was filtered off. The red-brown mother liquor was evaporated further, until only an amorphous tan precipitate was produced. The green precipitate was dissolved in boiling acetone and filtered rapidly while hot. The filtrate was then concentrated by boiling to about one-tenth its original volume. On cooling, crystallization occurred rapidly. The green mother liquor was then decanted, and the yellow crystals were washed with cold acetone. These were then recrystallized three times, as previously described.

Method 3.—Extraction with cold acetone was carried out as described in the above paragraph. The mother liquor in this case was

[2] The eastern and the California Spanish moss are not in any way related. The former is a seed-plant of the family Bromeliaceae and the latter is a lichen.

[3] The filtrate was evaporated to dryness and extracted with petroleum ether. The ether-soluble fraction (a brownish yellow noncrystalline substance) was disso ved in olive oil and tested against soil mycobacteria by the Oxford cup method and found to have strong antibacterial activity. The water-soluble fraction had little activity. These fractions have not been followed further.

yellow. The separation of crystals from amorphous material was carried out in the same way.

The yield by methods 2 and 3 was approximately 8 gm. of purified crystalline material per 10 lb. of lichen.[4]

PROPERTIES OF THE CRYSTALLINE MATERIAL

Solubility.—Readily soluble in hot acetone, ethyl alcohol, propylene glycol, ethyl ether. Poorly soluble in hot petroleum ether, cold alcohol, propylene glycol. Moderately soluble in cold acetone. Insoluble in water and in HCl.

Melting point.—191–192° C. when heated at an increment of 0.2° per minute, after first being brought rapidly to 160° C.

193–194° C. when heated at a uniform increment of 0.5–1.0° per minute.

The melt is brown. The crystals obtained when the melt cools are yellow-brown. The crystals melt readily in camphor. However, when the mixture is again heated, there appears to be progressive decomposition with no definite melting point.

Titration.—The substance is acid and has a neutralization equivalent of 298–310, as measured by titration in acetone.

Composition.—On analysis, no ash, nitrogen, or halide was found. The percentage composition of the batch obtained with hot acetone-alcohol extraction was (*a*) C—62.75, H—4.63, (*b*) C—62.75, H—4.69. Analysis of the batch extracted with cold acetone-alcohol gave a percentage composition of (*a*) C—63.05, H—4.49, (*b*) C—63.00, H—4.64.

The substance was found to contain no methoxyl groups. To prepare the methoxyl derivative, the substance was dissolved in acetone, diazomethane in ether was added, and the volatile material was evaporated. The ester could not be crystallized. It was distilled in a molecular still, under a pressure of 0.001 mm. Hg or less at a temperature of 140–170° C. The distillate was a resin with a percentage composition of C—63.75, H—5.26, OCH_3—9.50.

From the methoxyl content, a minimum molecular weight of 326 is obtained for the ester, corresponding to a weight of 312 for the acid, which is in agreement with the titration results. Since a substance with a molecular weight twice this size would not be expected to distill at the temperatures observed, the minimum weights may be considered to represent the actual molecular weight. The results thus indicate one acid group per molecule and an empirical formula $C_{16}H_{14}O_6$

[4] The extraction cannot be carried out successfully in the presence of metal. When cold extraction was attempted using metal drums, no crystals could be obtained. Instead, a copious red-brown precipitate was found.

(C—63.5%, H—4.63%, O—31.8%) which is in reasonably good agreement with the values found on analysis of the acid.[5]

ANTIBACTERIAL PROPERTIES IN VITRO

Three strains of soil mycobacteria, B.4.1, B.5.1, and B.18.1, were obtained from stock cultures maintained by Dr. C. B. van Niel; the others were isolated from soil under his supervision. M_2, M_5, and M_6 were from cultures in which the carbon source was iso-amyl alcohol. M_8 appeared in the culture in which phenol was the carbon source.

Table 1 shows the response of these organisms to the antibacterial substance.

TABLE 1.—*Effect of* Ramalina *crystals on soil mycobacteria*

Culture [1]	Type [2]	Color	Minimum concentration of crystals (expressed in γ/cc.) at which growth is inhibited at room temperature after 8 days	
			Partial inhibition	Complete inhibition
M_2	S	Yellow	0.50	5.0
M_5	S	Pink	5.0	>50.0
M_6 [3]	R	Pink	<5.0	5.0
M_8	R	Gray-White	5.0	>50.0
B.4.1	S	Orange	0.5	5.0
B.5.1	S	Pink	0.05	>50.0
B.18.1	R	Orange	0.05	5.0

[1] Medium: yeast extract (Difco), glucose, 0.1 percent Tween 80.
[2] S=smooth colony surface on agar.
R=rough colony surface on agar.
[3] Organism is sensitive to Tween 80. To protect against Tween 80, 0.3 percent serum albumin was added to culture.

Table 2 shows the response of various bacteria to the antibacterial substance. The bacilli *Pseudomonas*, *Salmonella*, and *Shigella* were insensitive.

To determine whether there was sterilization or only inhibition of growth, samples were taken from cultures Number 14 to 20 (table 2) at the greatest crystal concentration which showed no growth. In each case, 0.1 cc. was added to plain broth and to blood broth. These cultures were then incubated for 18 hours and examined. The following table shows the results observed:

Culture No.	14	15	16	17	18	19	20
Growth	−	−	−	−	+	+	+

[5] I am indebted to Dr. Adalbert Elek for the elementary analysis and to Dr. Lyma[illegible] preparation and analysis of the methoxyl derivative.

TABLE 2.—*Growth of various bacteria in the presence of* Ramalina *crystals*

[Density of growth indicated by numbers 0–4]

Species	Growth after 18 hours incubation			
	50 γ/cc.	5 γ/cc.	0.5 γ/cc.	.05 γ/cc.
1. *Klebsiella pneumoniae*	4	4	4	4
2. *Bacillus coli*	4	4	4	4
3. *Bacillus proteus*	4	4	4	4
4. *Pseudomonas pyocaneous*	4	4	4	4
5. *Salmonella aertryke*	4	4	4	4
6. *Salmonella typhi murium*	4	4	4	4
7. *Shigella* D–6 (Dubos)	3	4	4	4
8. *Shigella* VZ-48 (Goebbel)	3	4	4	4
9. *Shigella* Z-Weill (Goebbel)	3	4	4	4
10. *Shigella* Sonne (Goebbel)	4	4	4	4
11. *Staphylococcus aureus* 40 (Dubos)	4	4	4	4
12. *Staphylococcus aureus* 42-B (Dubos)	2	3	4	4
13. *Staphylococcus aureus* O'Hara (Dubos)	3	4	4	4
14. *Pneumococcus* type I SVI (Dubos)	0	3	4	4
15. *Pneumococcus* type II D-39 (Avery)	0	4	4	4
16. *Pneumococcus* type III A-66 (Avery)	0	1	3	3
17. *Streptococcus hemolyticus* T-36 (Lancefield)	0	4	4	4
18. *Streptococcus hemolyticus* T-32 (Lancefield)	0	1	3	3
19. *Streptococcus hemolyticus* T-28 (Lancefield)	0	2	3	4
20. *Streptococcus hemolyticus* H-69D (Lancefield)	0	4	4	4

NOTE: In species No. 14–20, inclusive, tests were made with and without defibrinated rabbit blood. In the presence of blood (approximately 2 percent), inhibition was the same as in broth. In species No. 18, clumping was observed in broth culture containing 5.0 and 0.5 γ/cc., but not at other concentrations.

Pneumococcus, *Streptococcus*, and some of the *Staphylococci* are inhibited by 50γ per cc. or less. Experiments designed to define more closely the minimal effective concentration in strains of *Pneumococcus* and *Streptococcus* showed complete sterilization of concentrations of 10–20γ per cc. in the former, while in the latter the variation between strains was much greater, i. e. from 10 to over 50γ per cc.[6] (table 2A).

TABLE 2A.—*Sterilization of cultures of* Pneumococcus *and* Streptococcus *by* Ramalina *crystals* [1]

Culture	Minimum concentration for sterilization in γ/cc.	Culture	Minimum concentration for sterilization in γ/cc.
1. *Pneumococcus* type I SVI Dubos	20	5. *Streptococcus* T-32 Lancefield	10
2. *Pneumococcus* type II D-39 Avery	20	6. *Streptococcus* T-28 Lancefield	>50
3. *Pneumococcus* type III A-66 Avery	10	7. *Streptococcus* H-69D Lancefield	>50
4. *Streptococcus* T-36 Lancefield	10		

[1] Tests were run in duplicate with the organisms grown in plain broth and in Avery's blood broth. Results were essentially the same in both cases.

Several strains of tubercle bacilli were tested, using Dubos' liquid medium containing 0.05 percent Tween 80 and 0.3 percent bovine serum albumin *(13)*. The results are given in table 3. The three different isolates of strain H_{37}RV, which showed somewhat different colony morphology, are listed together, since they gave identical

[6] To test possible activity of the crystalline substance in vivo against *Pneumococcus*, mice were inoculated with type II *Pneumococcus* and then given a solution of the crystals in sesame oil three times daily subcutaneously. There was no significant difference in mortality between the treated animals and the controls.

TABLE 3.—*Growth of various strains of tubercle bacilli in the presence of* Ramalina *crystals*

[Density of growth indicated by numbers 0–5]

Strain	Days after inoculation	γ/cc. 50	20	10	5	0.5	0
$H_{37}RV$ [1] (3 isolates)	9	0	0	1	1	2	2
	11	0	0	2	3	3	4
	14	0	0	2	3	4	5
	16	0	0	3	4	5	5
	22	0	0	4	5	5	5
Waller	9	0	0	1	1	2	0
	11	0	1	1	1	2	0
	14	0	2	3	3	5	2
	16	0	2	3	3	5	3
	22	0	3	4	4	5	5
Jamaica	9	0	0	1	1	1	±
	11	0	0	1	1	2	1
	14	(2)	0	2	2	4	4
	16	(2)	0	3	3	5	5
	22	(2)	0	4	5	5	5
Torres	9	0	0	±	±	±	1
	11	0	0	2	2	1	2
	14	0	0	3	3	4	5
	16	0	0	3	3	5	5
	22	0	0	4	5	5	5
TA_3S	9	0	2	2	2	3	3
	11	1	3	3	3	5	5
	14	3	4	4	4	5	5
	16	4	4	4	4	5	5
	22	4	4	4	4	5	5
Kirchberg	9	1	3	3	3	4	4
	11	2	3	3	3	5	5
	14	4	4	4	4	5	5
	16	4	4	4	4	5	5
	22	4	4	4	4	5	5
Ravenel	9	0	0	0	0	0	0
	11	0	0	1	±	0	0
	14	0	0	1	±	0	0
	16	0	0	1	1	0	0
	22	0	1	3	3	0	0

[1] Tests were made on 3 separate isolates. Since the results were identical for all 3, they are listed together in this table.
[2] Mold contamination.

NOTE: All cultures were grown in Dubos' medium containing 0.3 percent bovine serum albumin. Each tube was inoculated with 10-day-old cultures previously grown in Dubos' medium to give a final dilution of the inoculum of 10^{-4}.

results. The human strains showed complete inhibition by concentrations of 1:50,000 and noticeable inhibition at concentrations as low as 1:2,000,000, with the exception of the Waller strain, which required a concentration of 1:20,000 for complete, and 1:200,000 for partial, inhibition. The bovine strain (Ravenel) also required a concentration of 1:20,000 for complete inhibition. The two avian strains were markedly more resistant, showing only partial inhibition at a concentration of 1:20,000. To determine whether the bacteria had been killed or merely arrested in growth, 0.5 cc. of the medium from each of the negative cultures of the human strains was inoculated intraperitoneally into guinea pigs, which were sacrificed and autopsied 7 weeks later. Only one animal, the one which received the $H_{37}RV$ containing 20γ/cc., showed tuberculosis. The other five animals showed no signs of disease.

Table 4 shows the effect of 0.1 percent serum added to the medium.[7] The inoculum in this experiment was 400 times as great as in the preceding experiment. Apparently no protective effect is afforded by serum in this concentration.

TABLE 4.—*Effect of serum on inhibition of growth of human tubercle bacilli, $H_{37}RV$, by* Ramalina *crystals*

[Density of growth indicated by numbers 0–5]

Number of days after inoculation	Dubos' medium				Dubos' medium plus 0.1 percent serum								Dubos' medium plus
	No serum				Human serum				Bovine serum				0.1 percent albumin
	Concentration of crystals, in γ/cc.												
	40	4	0.4	0	40	4	0.4	0	40	4	0.4	0	0
1	0	1	2	2	0	1	2	2	0	1	2	2	2
2	0	2	3	3	0	2	2	3	0	2	3	3	3
5	0	3	4	4	0	3	4	4	0	3	4	4	4
7	0	3	4	4	0	3	4	4	0	3	4	4	4
12	0	3	4	5	0	3	4	5	0	3	4	5	5

NOTE: Inoculum from 7-day-old culture, to give final dilution of 4×10^{-3}.
Albumin: Armour bovine serum albumin (fraction V).
All tubes were run in duplicate.
Dispersion:
4 γ crystals per cubic centimeter resulted in growth as coarse clumps.
0.4 γ crystals per cubic centimeter resulted in growth as medium clumps.
Controls with no crystals produced fine suspensions with no macroscopic clumping.

PROPERTIES IN VIVO

I. Toxicity—Crystals dissolved in sesame oil. All injections subcutaneous.

A. Mice (25 gm.):

1. *Single injections.*—2.0 mg. was lethal, death occurring within 18 hours. 1.5 mg. was not lethal. Animals survived indefinitely.

2. *Successive injections.*—An initial injection of 1.25 mg. in 0.25 cc. of oil was followed in 22 hours by a second dose and 6 hours later by a third dose. The animal showed no symptoms and was sacrificed 24 hours after the last injection. There was oil at the site of injection, but no local tissue reaction.

Animals receiving two injections of 1.25 mg. each, in 0.25 cc. of oil at 24-hour intervals, were sacrificed 7 days later. Oil was found walled off in a thin connective-tissue membrane about which was a thin pad of fatty tissue suggesting the laying down of new fat.

B. Guinea pigs (250–350 gm.):

30 mg. (10 mg./cc.), followed by a second similar dose in 24 hours, was lethal in 5 hours.

20 mg. (10 mg./cc.), given daily for 3 days, produced no symptoms.

One animal receiving two injections of 15 mg. (10 mg./cc.), with a 6-hour interval between injections, was sacrificed 7 days later. At the site of one

[7] Preliminary trials with rabbit serum showed that it contained a factor which inhibited the growth of tubercle bacilli and it was therefore not used.

injection there was a small avascular area in the skin, but no other reaction. (In this case the tip of the needle had apparently come into the dermis.) The other site (inguinal) showed a yellow-white area, about 1 x 1 x 0.4 cm., composed of fatty tissue enclosing many oil droplets. Smears taken from both sites showed monocytes laden with oil droplets.

II. Local reaction to Tween 80 and to Tween 80-oil mixtures.

Guinea pigs (350–400 gm.): All injections were subcutaneous into the inguinal region.

Tween 80 only.—0.5 cc.—2 days later. There was no visible local reaction. Smear taken from site showed occasional leucocytes (polymorphys and monocytes, neither containing fat).

2.0 cc.—3 days later. Small amount of somewhat bloody exudate. Smear showed only erythrocytes, and these appeared to be intact. Fascia at site of injection and over surrounding abdominal muscle was thickened and yellow-white.

Tween and sesame oil, 1.0 cc. Examination 24 hours after injection.

Tween	*Oil*
9	1—Slightly bloody exudate with very fine, fat droplets. Fascia markedly swollen and gelatinous. Vein at site of injection much larger than contralateral.
5	5—Clear exudate containing fat droplets. Abdominal fascia swollen and gelatinous. At site of injection, fascia dense white but not swollen or thickened. Vein at site much larger than contralateral.
1	9—No exudate, no oil. Vein at site larger than contralateral.
1	9—No trace of oil or Tween: Vein larger than contralateral.
2	8—No trace of oil or Tween. Vein larger than contralateral. Fasciae seem softer than normal when manipulated with forceps.
3	7—As above.
4	6—No oil or Tween visible. Slight gelatinous swelling of collagen confined to site of injection. Venous system more prominent and veins more dilated than contralateral.

Tween-oil-saline emulsion: 20 percent Tween in 0.9 percent saline—1 cc. injection: Examination 18 hours after injection.

20% Tween	*Oil*
1	1—Area in abdominal muscle (1 x 3 cm.) over site of injection bright red (appears to be hemorrhage produced by needle). Fat pad also red. No exudate.
1	9—Fat pad slightly pinkish. Vein enlarged. No exudate, some free oil.

III. Mobilization of crystals from site of injection.

Crystals in suspension in saline, plus Tween 80.

A. Guinea pigs (350–400 gn.). Dose, 0.5 cc.

Crystals, 20 mg.[3]; 0.1 cc. 20-percent Tween 80; 0.9 cc. saline:

(a) 1 day.—Vein and venules enlarged. Fat pad seemed somewhat la als, and slightly pinker than contralateral pad. Yellow mass of c ion or 3 x 5 mm., adjacent to fat pad and vein. No inflam exudate.

was completely

[3] 10 mg./cc. in sesame oil was completely soluble at 37° C. 20 mg./cc. in sesam soluble at 42° C.; precipitated at 36–37° C.

(b) 3 days.—Vein slightly enlarged. Fat pad same as contralateral pad. Yellow mass of crystals, 3 x 5 mm. No local reaction.

(c) 6 days.—Vein normal. Fat pad same size as contralateral pad, but pinkish. Yellow mass of crystals, 3 x 5 mm. No reaction in tissue surrounding mass other than a slight pinkish color to the fat mass.

It was clear from the results obtained that saline suspensions did not provide an adequate means for dispersing the antibacterial agent in the animal body. Solutions in oil alone were also unsuitable, since a good deal of the oil remained in situ, although some oil may have been incorporated into the fat cells. The results obtained with aqueous solutions of Tween 80 indicated that they reduced capillary permeability locally. By adding Tween 80 to sesame oil in suitable proportions, it was possible to have the oil taken up into the circulatory system with no obvious local or systemic injury. Experiments were therefore performed to determine whether it would be possible to have an adequate amount of the antibiotic taken into the circulation along with the oil.

The following shows the results obtained with mice:

B. Mice (25 gm.)

Solution, 5 mg. crystals in 1 cc. of oil plus Tween 80, in the proportion of 5 mg. crystals, 0.1 cc. Tween 80, 0.9 cc. sesame oil.

Dose cc. solution	mg. crystals	*Local reaction after 24 hours*
0. 4	2	soft white fatty tissue, few oil droplets.
0. 2	1	fatty tissue with slight fibrosis, no oil or exudate.
0. 1	0. 5	slight increase in fatty tissue, no fibrosis, oil or exudate.
0. 05	0. 25	very slight increase in fatty tissue, no other change.

One-half to one mg. in 0.1–0.2 cc. oil containing 10 percent Tween 80 could be taken up without appreciable local damage.

By trial it was found that 0.1 cc. of a 20-percent solution of Tween 80 in saline added to 0.9 cc. oil produced a fine stable emulsion. The crystals were then dissolved in oil and the solution made into an emulsion, by the method just given. When emulsified, some of the crystalline material precipitated out, but was easily resuspended. The following results show that 20 mg. given in a 1-cc. emulsion was still not completely absorbed after 4 days, whereas 10 mg. in the same volume of emulsion was completely absorbed in 2 days.

C. Mobilization of crystals from site of injection in guinea pigs.

Crystals in saline-Tween-80 emulsion.

Guinea pigs (250–320 gm.). Dose, 0.5 cc. subcutaneously, inguinal.

1. Crystals, 20 mg.; 0.1 cc. 20-percent Tween 80 in saline; 0.9 cc. oil:

(a) 1 day.—Vein and venules enlarged, fat pad pinkish, yellow mass of crystals, 3–4 mm.

(b) 2 days.—Vein enlarged, fat pad pinkish and larger than in (a). Yellow mass of crystals much smaller than in (a), 1–2 mm. in diameter.

(c) 4 days.—Vein slightly enlarged, fat pad slightly hemorrhagic, yellow mass 1 x 2 mm.

2. Crystals, 10 mg.; 0.1 cc. 20-percent Tween 80 in saline; 0.9 cc. oil; 0.5 cc. subcutaneous, inguinal:

2 days.—Fat pad enlarged; pinkish, with slight fibrosis. No crystals. A few free fat droplets visible in fat pad. Vein and venules dilated. Skin directly in contact with injected mass avascular, 3 mm. in diameter. No inflammation or necrosis in or surrounding this area.

Since it appeared feasible to administer the antibacterial substance in adequate amounts, an exploratory experiment on the effect of this material on tuberculosis in guinea pigs was undertaken. Thirty virgin female guinea pigs were distributed into four groups so that each group had the same weight distribution, the range in weight being 330 to 420 gm. A fifth group of four animals in approximately the same weight range was inoculated with tubercle bacilli, but was not otherwise treated. Animals in groups I, III and V (see table 5)

TABLE 5.—*Effect of* Ramalina *crystals on weight of normal and tuberculous guinea pigs*

Group	Treatment	Animal number	Weight in grams			Change in weight in grams		Percentage change in weight	
			Initial	14th day	29th day	0–14 days	14–29 days	0–14 days	14–29 days
		517	331	321	(288) 18 days	−10	(−33) 18 days	−3.0	−10.3
		3586	350	331	305	−19	−26	−5.4	−7.8
		3587	356	353	338	−3	−15	−0.8	−4.3
I	Tubercle bacilli. Crystals in Tween-80-oil	2417	375	372	325	−3	−47	−0.8	−12.6
		3591	378	371	310	−7	−61	−1.9	−16.4
		3589	383	368	345	−15	−23	−3.9	−6.2
		3581	387	381	285	−6	−96	−1.6	−25.2
		3593	392	410	421	+18	+11	+4.6	+2.7
		3582	396	382	329	−14	−53	−3.5	−13.9
		3583	400	425	449	+25	+24	+6.3	+5.6
		2633	342	353	270	+11	−72	+3.2	−23.5
		3584	351	336	(260) 25 days	−15	(−82) 25 days	−4.3	−19.9
		3560	360	361	287	+1	−73	0	−20.5
III	Tubercle bacilli. Tween-80-oil	3568	378	362	269	−16	−109	−4.2	−25.7
		3562	383	355	(276) 24 days	−28	(−107) 23 days	−7.3	−22.2
		3564	385	390	308	+5	−77	+1.3	−21.0
		3557	389	406	370	+17	−19	+4.4	−8.9
		3597	394	418	282	+24	−112	+6.1	−32.5
		3570	390	465	477	−34	+78	−8.5	+2.6
		3590	403	412	327	+9	−76	+2.2	−20.6
II	No tubercle bacilli. Crystals in Tween-80-oil	3580	343	380	393	+37	+13	+10.8	+3.4
		3596	368	396	432	+28	+36	+7.6	+9.1
		3569	385	385	415	0	+30	0	+7.8
		3588	390	416	456	+26	+40	+6.7	+9.6
		3573	411	440	480	+29	+40	+7.1	+9.1
		3578	345	368	379	+23	+11	+6.7	+3.0
IV	No tubercle bacilli. Tween-80-oil	3548	375	419	449	+44	+30	+11.7	+7.2
		3598	386	413	445	+27	+32	+7.0	+7.7
		3592	392	444	481	+52	+37	+13.2	+8.3
		3556	412	455	518	+43	+63	+10.2	+13.9
		3547	327	326	312	−1	−14	0	−4.3
		3575	423	436	386	+13	−50	+3.0	−11.3
V	Tubercle bacilli only	3561	323	315	(259) 28 days	−8	−56	−2.5	−17.8
		3551	413	391	301	−22	−91	−5.2	−23.3

were inoculated intraperitoneally with 0.01 mg. of tubercle bacilli suspended in a saline-oil emulsion containing 0.05 percent Tween 80. The bacteria were obtained from a 16-day-old culture grown in Dubos' medium. Groups I and II received injections of the antibacterial substance; groups III and IV received injections of the solvents only, in the same amounts and according to the same schedule used for groups I and II. Group V was untreated. Thus, groups II and IV were nondiseased animals acting as controls for groups I and III, while group V was the control for the possible effect of the solvents on the course of the disease.

The schedule for injections is given below. All injections were made into the inguinal region and successive injections were alternated from right to left side.

Dose schedule[1]

Date	Crystals (in milligrams per day)	Sesame oil (in cubic centimeters per day)	Tween 80 (in cubic centimeters per day)	Type of mixture
Aug. 5–Aug. 8	20	2	0.4	Suspension.
Aug. 9–Aug. 10	20	1	0.1	Suspension.
Aug. 11–Aug. 18	10	0.5	0.01	Emulsion.
Aug. 19–Aug. 25	10	1.0	0.02	Emulsion.

[1] If a small amount of the antibacterial agent dissolved in oil containing Tween 80 is injected intradermally, there is immediate blanching, followed by necrosis and ulceration. There is no inflammation of the surrounding tissue and the ulcers heal rapidly.

During the period August 11–August 18, the suspension was administered in single daily doses. During the other periods, the dose was given in two injections, 10–12 hours apart.

By August 9, many of the animals showed a thickening of the skin at the site of injection or over the whole abdomen. By August 11, the swelling was much reduced and disappeared in the next few days.

No injections were given after the twentieth day.

Figures 1 to 5 show the change in weight of the animals in the course of the experiment. Animals which were not inoculated with tubercle bacilli showed a gain in weight after the first week. The untreated tuberculous animals showed little or no weight gain and began to lose weight rapidly 2 weeks after inoculation. Nine of the tuberculous animals which received only the oil injections showed little change in weight during the first 2 weeks, after which there was a rapid and continuous loss in weight. The tenth animal continued to gain weight up to the twenty-seventh day. In group I (tuberculous animals treated with crystals in oil), as in group III, there was little change in the first 2 weeks. There was then an appreciable loss of weight in all but two of the animals in the following week. These two animals then gained weight until the end of the experiment.

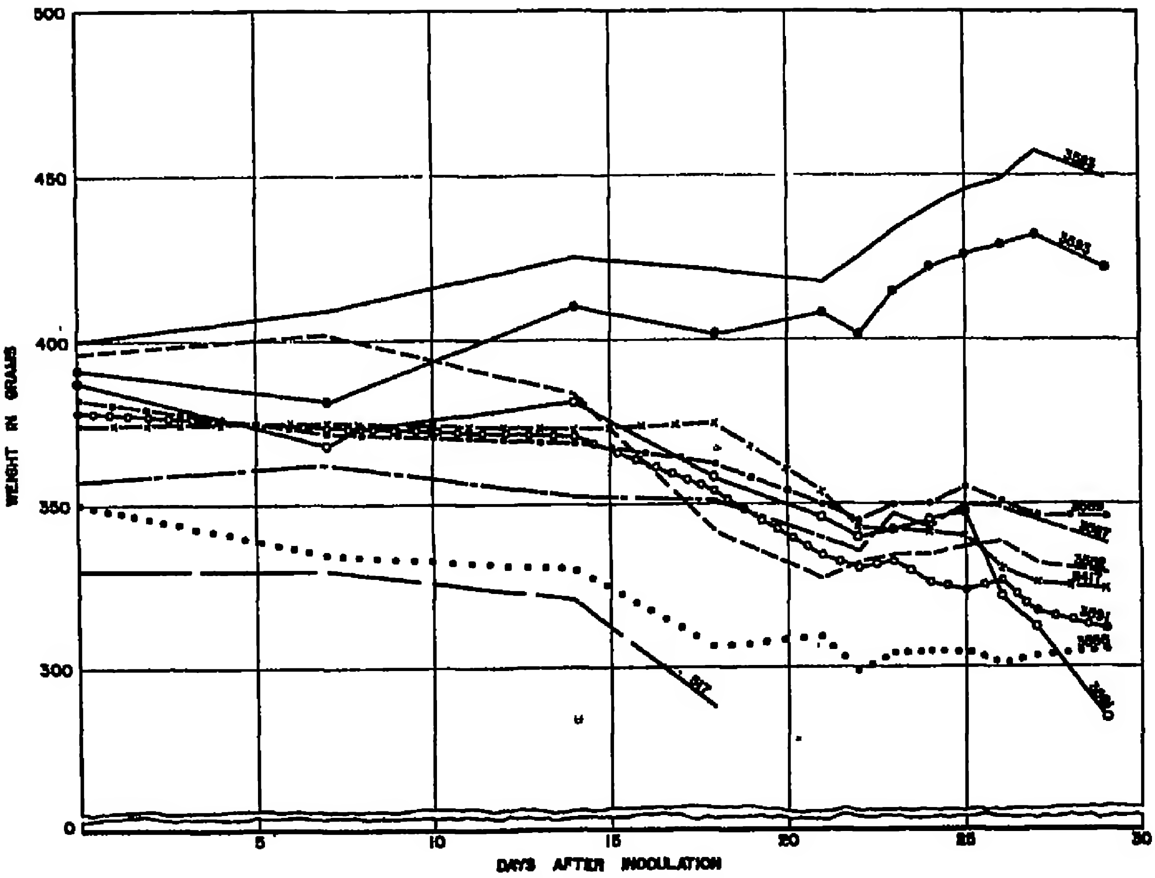

FIGURE 1.—Inoculated with tubercle bacilli, treated with crystals in oil-Tween-80. Group I

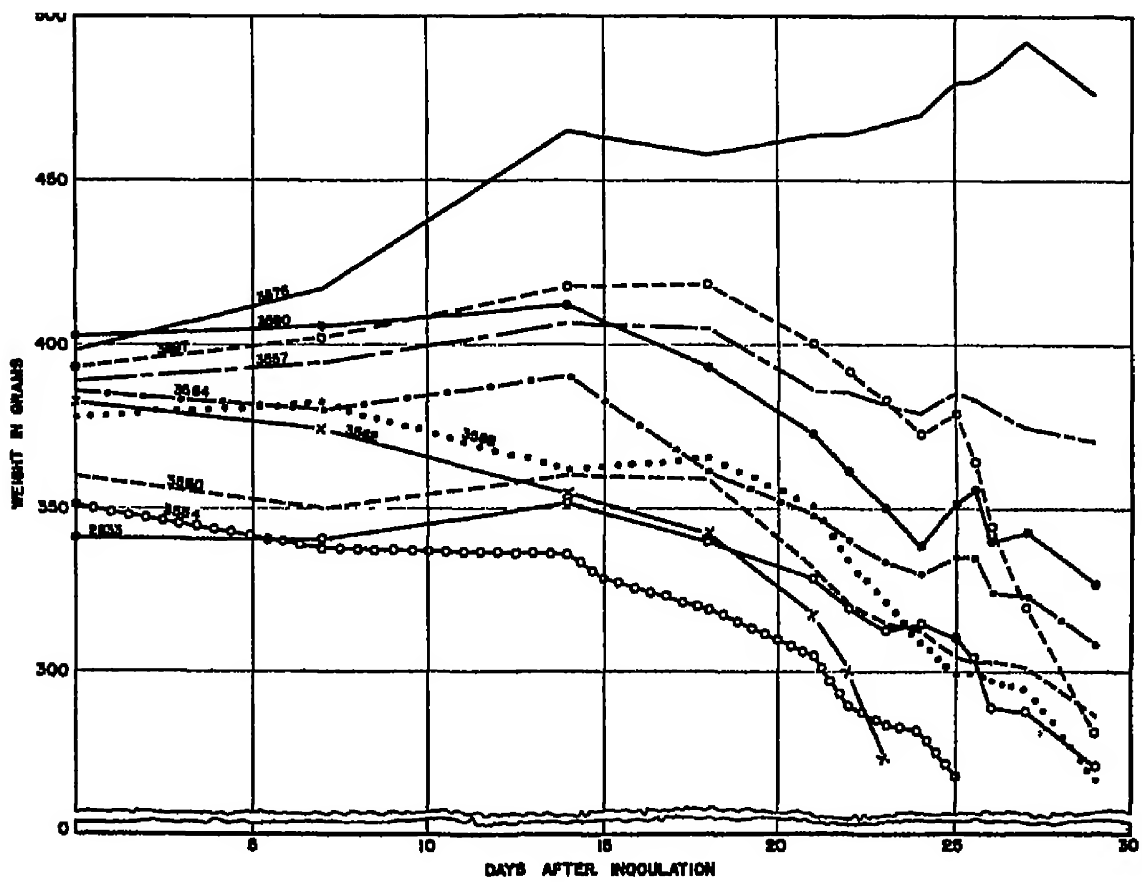

FIGURE 2.—Not inoculated with tubercle bacilli, treated with crystals in oil-Tween-80. Group III.

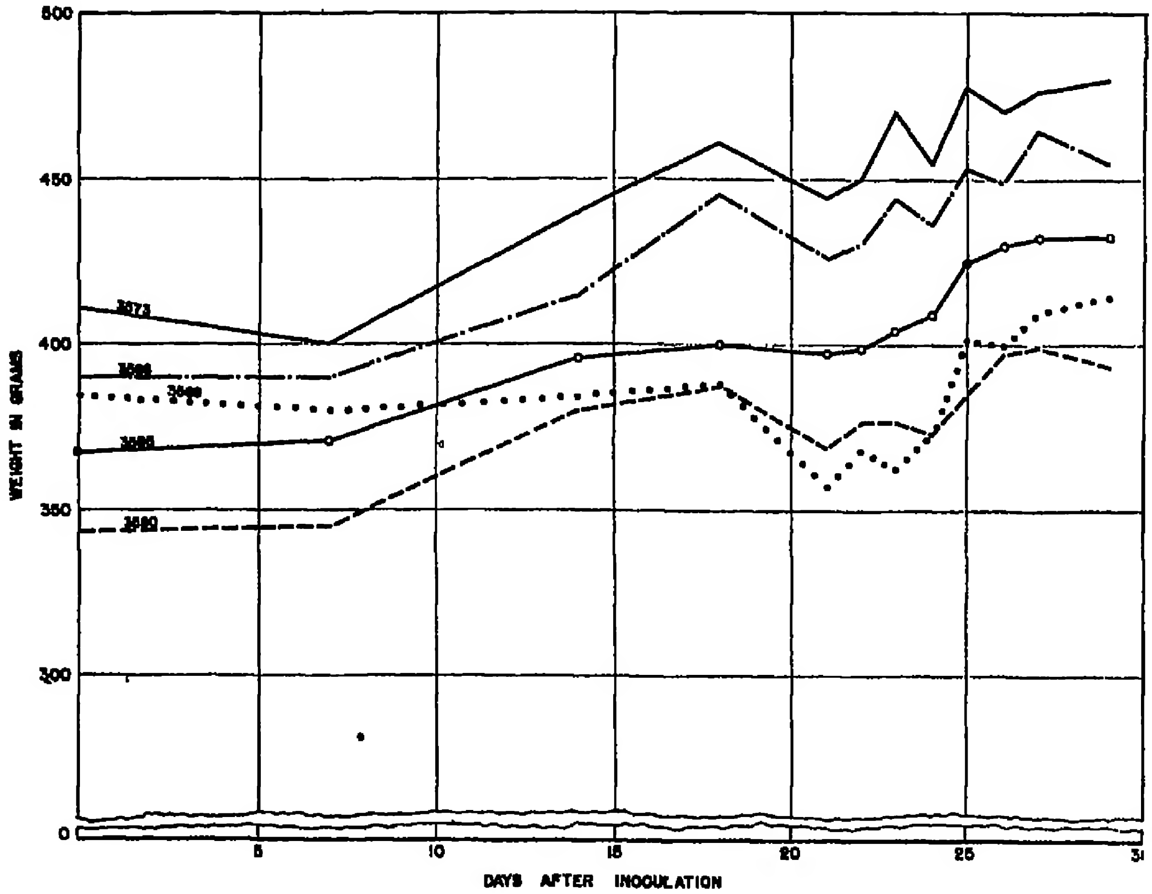

FIGURE 3.—Not inoculated with tubercle bacilli, treated with crystals in oil-Tween-80. Group II.

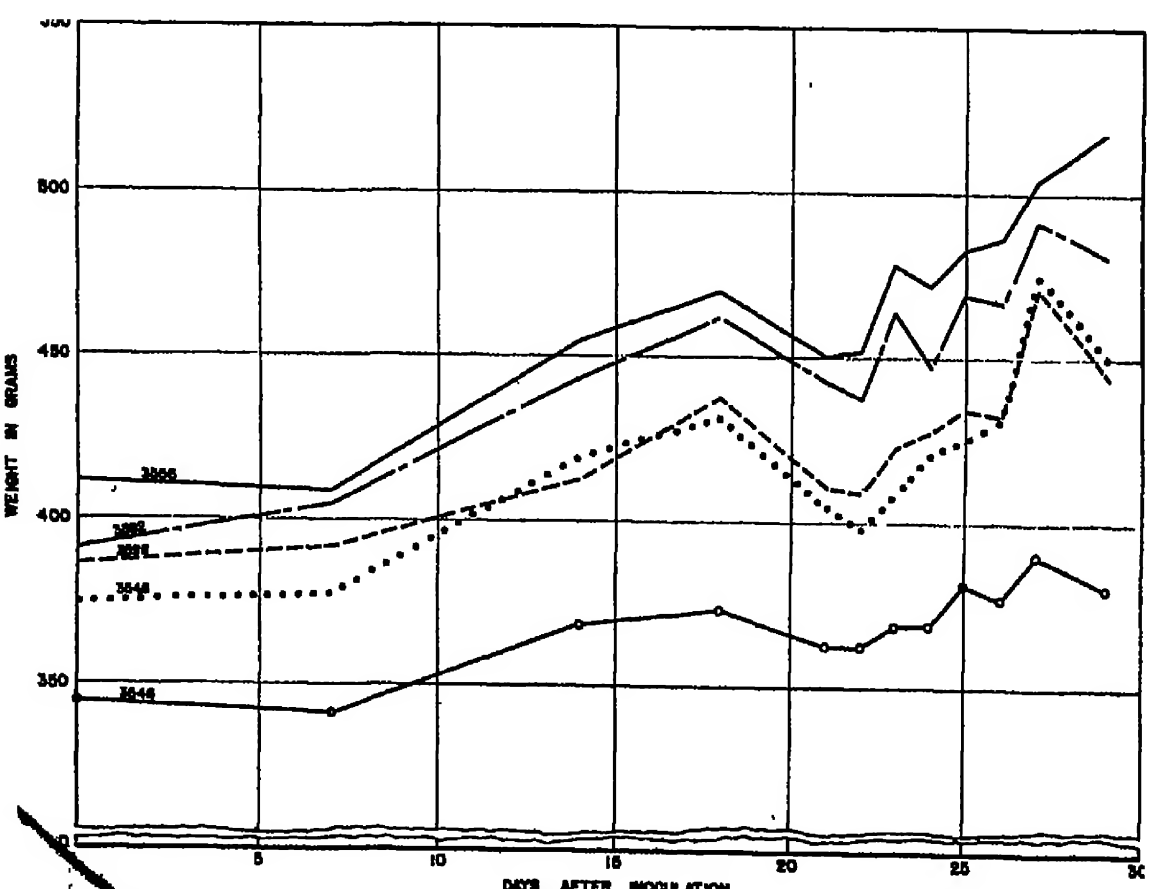

FIGURE 4.—Inoculated with tubercle bacilli, treated with oil-Tween-80 only. Group IV.

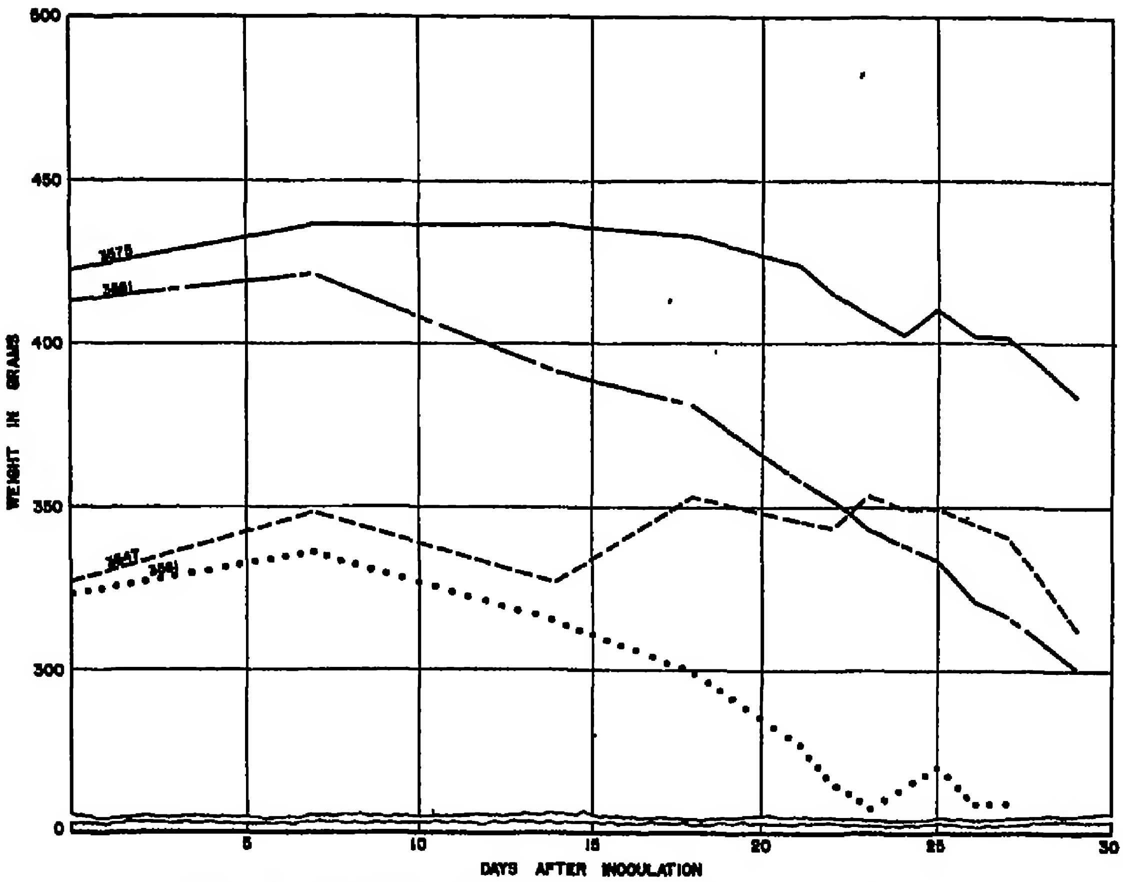

FIGURE 5.—Inoculated with tubercle bacilli, no treatment. Group V.

One animal (in the lowest weight group) died on the eighteenth day and was found on autopsy to have severe tuberculosis. Another animal, No. 3581, showed a precipitous loss in weight, beginning on the twenty-sixth day. It died 3 days later, but on autopsy showed very little tuberculosis. The weights of the other animals in this group remained at about the same level until the end of the experiment. The change in weight for each animal is shown in tabular form in table 5. In group III, there was a weight loss of 20 percent or more in each surviving animal, with the exception of two animals. In group I, animal No. 3581 showed a weight loss of 25 percent. With the exception of this animal, the loss in weight for animals in group I was appreciably and consistently lower than for animals in group III.

Since the distribution of weights at the start of the experiment was the same in both group I and group III, a simple comparison may be made of the total weight loss in each group. There were nine animals in group I, and eight in group III which survived 29 days. In group I, the weight of these surviving animals decreased from 3,388 grams on the fourteenth day to 3,107 grams on the twenty-ninth day, a decrease of 8 percent. In group III, the weight change during this period was from 3,167 grams to 2,590 grams, representing a weight loss of 19 percent. In other words, during the last 2 weeks, the surviving animals in group III lost more than twice as much weight as those in group I.

Injections were discontinued after the twentieth day and no further treatment given until the experiment was terminated on the thirty-second day, in order to allow disease to develop which might have been arrested but not eradicated during the first 20 days. All surviving animals were then sacrificed and autopsied. The extent of involvement of lung, liver, spleen, lymph nodes and omentum was estimated as "severe," "medium," "very slight," and "none"; in the lung, by the amount of consolidation; in the liver, by the number and size of "tubercles"; in spleen and lymph nodes, by enlargement; and in the omentum, by fibrosis. A rough estimate of the severity of the disease could be made on this basis (table 6).

In group I, there were two animals which could be classified as

TABLE 6.—*Findings at autopsy*

Animal No.	Days after inoculation	Died or sacrificed	Percentage change in weight	Lesions [1]					Estimated severity of disease
				Lungs	Liver	Spleen	Nodes	Omentum	
GROUP I. CRYSTALS, TWEEN 80 AND OIL									
517	18	d	−13	m	s	s	o	2	s
3581	31	d	−26	m	o	o	o	5	o-v
3586	32	s	−13	m	m	o	o	3	m
3587	32	s	−2	m	m	s	v	6	m
2417	32	s	−13	m	s	m	m	4	m
3591	32	s	−18	m	v	v	o	6	v
3589	32	s	−10	v	v (scars)	o	o	5	v
3593	32	s	+7	o	o (scars)	m	o	1	o-v
3582	32	s	−17	s	s	m	m	5	s [2]
3583	32	s	+12	o	o	o	o	2	o
Total									2 s, 3 m, 5 o-v
GROUP III. TWEEN 80 AND OIL									
3562	24	d	−28	s	s	s	m	2	
3584	25	d	−23	m	s	s	m	3	
3568	30	d	−29	s	s	s	m	5	
3597	30	d	−29	s	s	s	m	4	
2033	32	s	−21	s	s	s	s	4	
3560	32	s	−20	s	m [3]	s	s	4	
3504	32	s	−20	s	s	s	s	1	
3557	32	s	−5	s	m	s	m	6	
3576	32	s	+20	v	m	s	s	6	
3590	32	s	−19	s	s	s	s	3	s
Total									9 s, 1 m
GROUP V. NO TREATMENT									
3561	28	d	−20	m	s	s	s	4	s
3547	31	d	−5	s	s	s	s	5	s
3551	32	d	−27	m	s	s	s	5	s
3575	32	s	−9	s	s	s	m	2	s
Total									4 s

[1] Symbols:
o, no lesions
v, very slight
, mild
s, severe
1–6, extent of fibrosis of omentum

[2] Entire right flank filled with liquid odoriferous pus. Abdomen much swollen.

[3] Many tubercles on diaphragm and lining of peritoneal cavity.

having severe disease. One of these, No. 517, died in the early stages of the experiment; the other, No. 3582, was found to have a huge infected abscess containing nonacid-fast gram-negative bacilli, which spread from the groin across the entire flank and abdomen. Three animals had mild, and five had very slight or no disease. In group III, one animal had mild disease, while in the other nine, disease was severe.

Mortality is shown in table 7. There were twice as many deaths in the controls as there were in the treated group. Thus, on the basis of weight change, mortality, and findings at autopsy, the group of animals treated with the crystalline substance showed much less disease than the controls.

TABLE 7.—*Guinea pig tuberculosis mortality*

Group I			Group III			Group V		
Animal No.	Days after inoculation	Weight loss, in grams	Animal No.	Days after inoculation	Weight loss, in grams	Animal No.	Days after inoculation	Weight loss, in grams
517	18	43	3562	24	107	3561	28	64
3581	31	120	3584	25	82	3547	31	24
			3568	30	109	3551	32	131
			3597	30	102			
Fraction dead, 0–32 days	2/10		Fraction dead, 0–32 days	4/10		Fraction dead, 0–32 days	3/4	

CONCLUSION

A crystalline substance has been isolated from the lichen *Ramalina reticulata*, with a melting point of 191–192° C. and an empirical formula of $C_{16}H_{14}O_6$. It can be administered subcutaneously in oil, daily, at a rate of 10–20 mg. per 350–400 gm. guinea pig for a period of 3 weeks without obvious toxic effects. When so administered to guinea pigs infected intraperitoneally with human tubercle bacilli of the strain $H_{37}RV$, it appears to retard the progress of the disease.

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DISSEMINATED PULMONARY CALCIFICATION [1]

A Report of 113 Cases

By Robert H. High, *Assistant Surgeon*, Henry B. Zwerling, *Surgeon (R)*, and Michael L. Furcolow, *Surgeon, United States Public Health Service*

During the past 30 years, there has been considerable discussion and speculation in American medical literature concerning the possible cause of disseminated pulmonary calcification. It has been suggested that such calcification represents healed miliary tuberculosis (*1, 2, 3, 4, 5*) or healed tuberculous bronchopneumonia (*5*). Sutherland (*6*) suspected that abnormalities in calcium metabolism were responsible. Sayers and Meriwether (*7*) found 125 instances of disseminated pulmonary calcification among approximately 18,000 miners in Picher, Okla., and suggested that in addition to healed miliary tuberculosis, a pneumomycosis should be considered as a possible etiologic agent. Geever (*8*) noted two instances of such calcification in nonreactors to tuberculin, but was unable to determine the etiology from his roentgenographic and histopathologic material. Lumsden and Dearing (*9*) found 11 cases which they considered to be of miliary calcification, in a survey conducted in Giles County, Tenn. Ten of these cases were found among 4,377 whites, and one among 983 Negroes, a rate of 2.3 per thousand and 1.0 per thousand, respectively. Long and Stearns (*10*) pointed out that pulmonary calcifications were observed in over 15 percent of the draft inductees from those stations "bounded roughly by Fort Oglethorpe, Ga.; Jefferson Barracks, Mo.; Little Rock, Ark.; and Columbus, Ohio." "Also disseminated 'miliary' calcifications . . . seemed relatively more frequent in this area." From films taken in preemployment examinations in various Indiana industries, Spolyar (*11*) collected approximately 65 cases which he regarded as possible instances of healed pulmonary aspergillosis.

It should be noted that most cases of disseminated pulmonary calcification have been found in the central region of the United States. It has been observed for more than 20 years that many people in this region have pulmonary calcification but do not react to tuberculin. Palmer (*12*) has noted that in this area nontuberculous pulmonary calcification is most frequently found in persons who react to histoplasmin. He has also pointed out (*13*) that in the United States significant geographic differences exist in the levels of histoplasmin sensitivity and, furthermore, that these levels are highest in the central region. Zwerling and Palmer (*14*) reported 15 persons who showed disseminated pulmonary calcification, and noted that 14 reacted to histoplasmin.

[1] From the Field Studies Section, Tuberculosis Control Division.

The cases of disseminated pulmonary calcification to be presented in this paper have been restricted to those instances in which at least five separate calcareous deposits were noted in each lung field. Further, the deposits must have been scattered over at least one-half of each lung field. In almost every instance, these minimal requirements were exceeded. Through adherence to these criteria, disseminated pulmonary calcifications may be divided into two groups. The first is designated "miliary calcification" (fig. 1). The calcifications are small, round, uniform in size, numerous, and widely and symmetrically scattered throughout each lung field. This type is sometimes called "wheatena" or "buckshot" calcification. The second group is designated "multiple bilateral calcification" (fig. 2). In these instances the calcareous deposits are fewer in number, often irregular in outline, of varying size, and often distributed in an asymmetric pattern. In each group, two subgroups may be made, according to whether calcareous deposits are observed in the hilar regions.

The distinction between the two groups is of interest because most observers feel that the "miliary" type results from hematogenous dissemination of the causative agent (*1, 2, 3, 4, 5*), whereas bronchogenic dissemination produces the "multiple bilateral" type (*5*).

MATERIAL AND METHODS

From various sources, 113 instances of disseminated pulmonary calcification were collected. Sixty-four of these were observed among a group of school children in Kansas City, Mo., for which considerable data have been reported by Furcolow, High, and Allen (*15*). It appears appropriate to consider these 64 cases separately so that they may be compared with the Furcolow, High, Allen report. The remaining 49 cases will also be discussed here.

All of the roentgenograms were read by two men, each experienced in the interpretation of pulmonary calcification. The 113 cases of disseminated calcification, found by either reader, were reviewed by both, first separately, and then together. The classification of these cases represents the final opinion of the two readers. The intradermal tuberculin and histoplasmin tests were given and read by two small groups that have worked together for several years. Each group used similar antigens and similar criteria for interpretation of the tests. The tuberculin used was 0.0001 mg. of PPD-S, furnished by Dr. Florence Seibert of the Henry Phipps Institute, University of Pennsylvania, Philadelphia; the histoplasmin, furnished by Dr. C. W. Emmons of the National Institute of Health (*16*), was a 1 to 1,000 dilution of his lot H_3. A reaction to both tuberculin and histoplasmin was considered positive if the induration measured 5 or more millimeters in diameter at the 48-hour reading.

FINDINGS

A study was recently conducted in Kansas City, Mo., by the Tuberculosis Control Division of the United States Public Health Service, with the cooperation of the City Health Department, Board of Education, and Tuberculosis Society, to determine various epidemiologic factors related to histoplasmin sensitivity. Approximately 16,000 children of school and preschool age were given intradermal tuberculin and histoplasmin tests, and were examined with an 11" x 14" or 14" x 17" roentgenogram of the chest.

Among this group of 15,980 children, whose ages ranged from less than 1 to 18 years, 64 instances of disseminated pulmonary calcification were found. The distribution of these cases according to age and sex for the white children is presented in table 1. Similar

TABLE 1.—*Cases of disseminated pulmonary calcification per 1,000 persons, by age, race, and sex. School children, Kansas City, Mo., 1945*

	White and Negro			White								
	Both sexes			Male			Female			Both sexes		
Age [1] (years)	Number		Rate per 1,000 persons tested	Number		Rate per 1,000 persons tested	Number		Rate per 1,000 persons tested	Number		Rate per 1,000 persons tested
	Children	Cases		Children	Cases		Children	Cases		Children	Cases	
0-4	242	0	0	119	0	0	88	0	0	207	0	0
4-6	2,482	2	.8	1,083	2	1.8	1,001	0	0	2,084	2	1.0
7-9	3,594	9	2.5	1,415	2	1.4	1,442	5	3.5	2,857	7	2.5
10-12	3,628	14	3.9	1,417	7	4.9	1,451	7	4.8	2,868	14	4.9
13-15	3,966	21	5.3	1,792	9	5.0	1,887	11	5.8	3,679	20	5.4
16-18	2,068	18	8.7	837	7	8.4	965	11	11.4	1,802	18	10.0
Total	15,980	64	4.0	6,663	27	4.1	6,834	34	5.0	13,497	61	4.5

[1] Age last birthday.

data are not presented for Negro children, since too few instances of such calcification were observed among them. It will be noted that among whites, the frequency of this type of pulmonary calcification rises steadily in successively older age groups. No cases were found among the 207 white children under 4 years of age, but in the age group 4–6, a frequency of 1.0 per thousand was found, and in the age group 16–18 this rate had risen to 10.0 per thousand. The findings are presented in figure 3.

Although the difference between white males and females is not statistically significant, it is of some interest to note that slightly more females than males presented this type of calcification.

If the rate of 4.5 per thousand found for white children were the same for Negroes, 11 cases would be expected among the 2,483 Negro

FIGURE 1.—Miliary type of pulmonary calcification (tuberculin negative, histoplasmin positive). Over 100 separate calcareous deposits are present in each lung field.

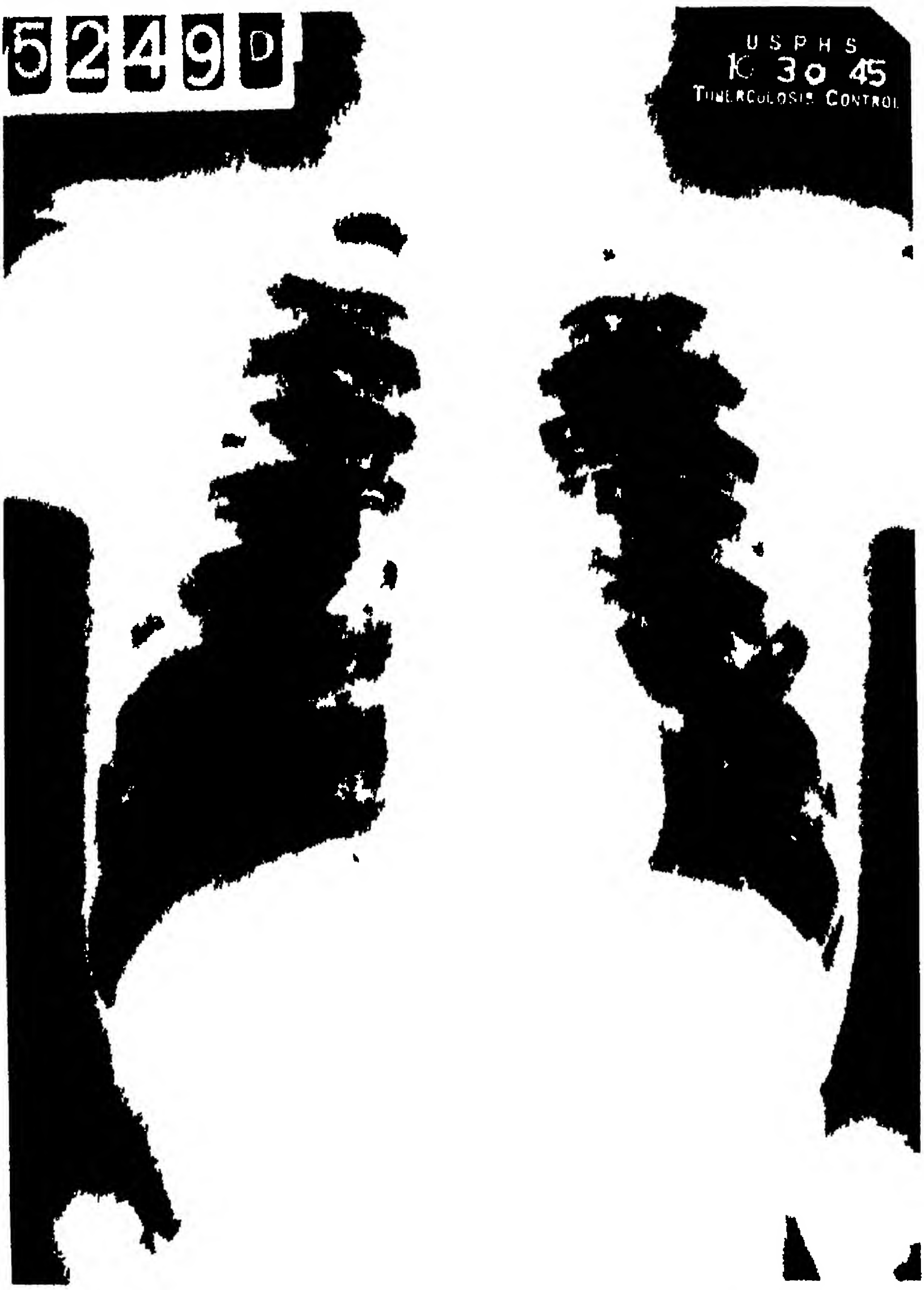

Figure 2.—Multiple bilateral type of pulmonary calcification, tuberculin negative, histoplasmin positive.

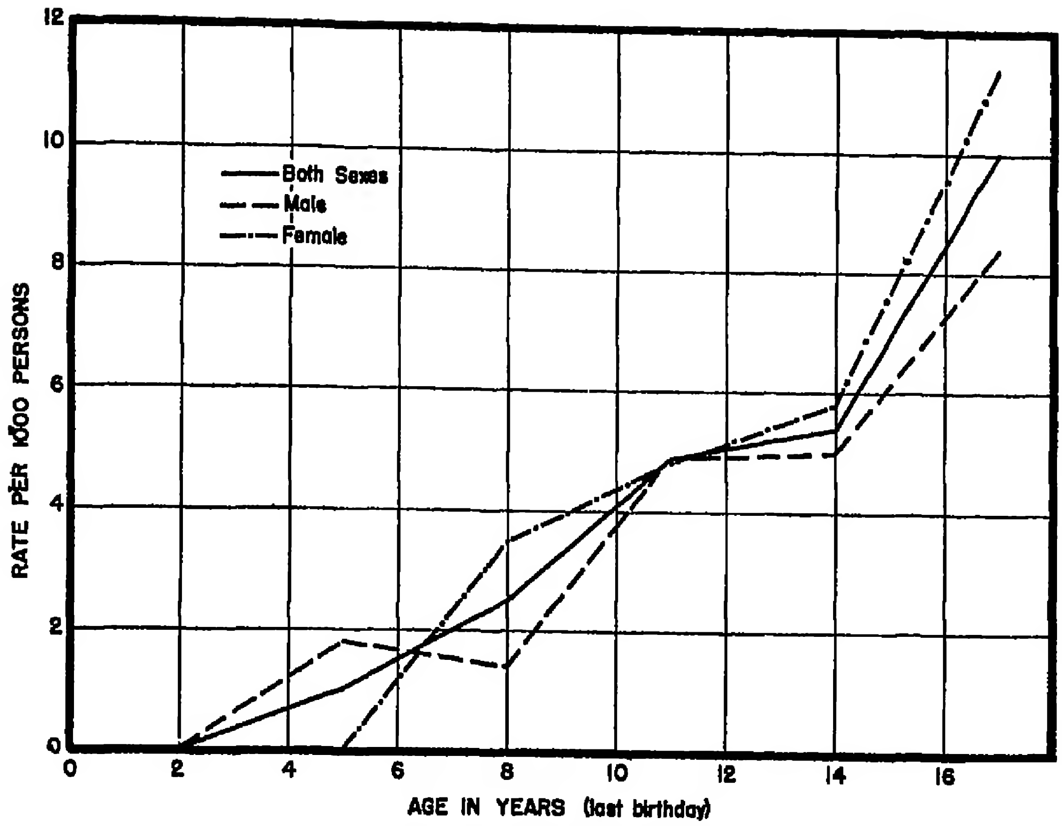

FIGURE 3.—Cases of disseminated pulmonary calcification per 1,000 persons by age and sex. Kansas City, Mo., white school children.

children. Actually, only 3 instances of disseminated pulmonary calcification were observed. Two males, one 9 and one 13 years of age, and one female 8 years of age presented this type of calcification. The observed rate for the Negro children is 1.2 per thousand, approximately one-fourth of that found for the whites. This racial difference appears to be statistically significant. Lumsden and Dearing (*9*), in the survey made in Giles County, Tenn., observed approximately the same racial difference.

Furcolow et al. (*15*) reported epidemiologic data from the same group of children. They found an increase with age in the frequency of all types of pulmonary calcification. The frequency of disseminated pulmonary calcification likewise shows an increase with age.

Of the 64 cases of disseminated calcification, 24 showed calcification in miliary patterns. Sixteen of these did not have calcareous deposits in the tracheobronchial lymph nodes, whereas the other 8 showed calcification in these structures. The remaining 40 cases presented multiple bilateral calcifications, 27 of which were associated with calcareous deposits in the tracheobronchial lymph nodes and 13 of which showed no such deposits. Of those with the miliary type, only 33.3 percent had calcareous deposits in these structures, whereas 67.5 percent with the multiple bilateral type had such deposits. Moreover, the calcareous deposits in the hilar areas in the multiple bilateral type tended to be larger and to contain more individual pieces of

calcium. These observed differences in hilar calcification may represent significant differences in the pathogenesis of these two types of disseminated calcification. The miliary type may represent hematogenous dissemination of the causative agent. The multiple bilateral type may be caused by bronchogenic spread, or by multiple "primary" foci.

In only 1 of the 64 cases of disseminated calcification was any other abnormality noted in the roentgenogram of the chest. In this 1 case, obliteration of the left costophrenic sulcus was seen. The remaining 63 cases did not show changes such as fibrosis, deviation of the trachea, localized or generalized emphysema, retraction of the lung root, atelectasis, etc.

In 62 of the 64 cases found in this study, tuberculin and histoplasmin tests were given. The results of these tests are presented in table 2. It is to be noted that 93.5 percent of those tested reacted only to histoplasmin, while none reacted to tuberculin alone. In 3.2 percent, neither skin test was positive, and in 3.2 percent, both skin tests were positive. Thus, disseminated pulmonary calcification was associated with a positive histoplasmin reaction in 96.8 percent of the cases. In the reactions to histoplasmin, there was no significant difference between the miliary and the multiple bilateral types.

It should be stated that all types of pulmonary calcification observed among these Kansas City school children were more frequently found in histoplasmin reactors than in tuberculin reactors. Furcolow et al. studied 6,528 school children who were part of the same group in which the cases of disseminated pulmonary calcification were found. They included only those children, however, whose chest roentgenograms were entirely satisfactory for interpretation of all types of calcification. The present report deals with the entire group because it is felt that disseminated calcification would be seen even on films of poor technical quality. Furcolow et al. found 828 cases of pulmonary calcification among the 6,528 school children. Of the 828 cases, 56, or 6.8 percent, occurred among children positive to both skin tests. Among those who reacted only to histoplasmin, 649 cases, or 78.4 percent, were found. Thirty-one cases, or 3.7 percent, were found among those who reacted only to tuberculin; and 92, or 11.1 percent, were found among those who reacted to neither test. In table 2, these results are compared with those found among the instances of disseminated calcification.

It is important to note that the percentage of histoplasmin reactors

was higher among those with disseminated calcification than among those with all types of pulmonary calcification. Among the former, 96.7 percent reacted to histoplasmin (or to histoplasmin and to tuberculin); and among the latter, only 85.2 percent reacted. The difference is significant.

TABLE 2.—*Percentage distribution by reactions to histoplasmin and tuberculin for all children tested—for children with pulmonary calcification and for children with disseminated calcification. School children, Kansas City, Mo., 1945*

Skin reaction	Among 6,528 school children [1]				Disseminated calcification among 15,980 school children	
	All children		Children with all types of pulmonary calcification			
	Total	Percentage	Total	Percentage	Total	Percentage
H+ T−	2,454	37.6	649	78.4	58	93.5
H+ T+	235	3.6	56	6.8	2	3.2
H− T+	273	4.2	31	3.7	0	0
H− T−	3,566	54.6	92	11.1	2	3.2
Total	6,528	100.0	828	100.0	62	100.0

[1] From Furcolow et al. (*15*).

From the above findings, it appears that tuberculosis, contrary to the opinion of many previous writers, is not the cause of the majority of such calcifications. Among the 62 cases, 60, or 96.7 percent, did not react to tuberculin, and only 2, or 3.2 percent, reacted to tuberculin as well as to histoplasmin. Less than one-third as many persons with disseminated calcification reacted to tuberculin as did persons with all types of pulmonary calcification.

From the data available for this group of children, it is impossible to state conclusively that these disseminated calcifications are caused by the agent producing histoplasmin sensitivity; but it seems more likely that they were caused by that agent than by the tubercle bacilli.

Of the 64 cases, 52 were found in as many families, while in each of 6 families, 2 siblings presented the same findings. Such unusual calcification, which occurs at a rate of 4 per thousand in the school population, is extremely unlikely to have occurred by chance in the siblings of 6 separate families. Five of the pairs were white, and one pair Negro. It should be noted incidentally that the Negro brothers were the only Negro males among the 1,155 studied who showed this type of calcification. In no case did the age difference between the

2 siblings exceed 4 years, and in 4 of the pairs the age difference was 2 years or less. In only 1 pair were children of unlike sex affected. These findings are summarized in table 3.

TABLE 3.—*Siblings showing disseminated pulmonary calcification by sex and age. School children, Kansas City, Mo., tested in 1945*

Family	Sex	Age [1]
1	F	11
	F	12
2	F	10
	F	12
3	M	9
	M	13
4	F	12
	F	14
5	M	6
	F	9
6	F	16
	F	17

[1] Age last birthday.

In another pair of siblings, incompletely calcified miliary densities were noted in one, and disseminated noncalcareous miliary densities were noted in the other. The findings in this pair suggest that the two children may have developed active disease at about the same time.

From sources other than the Kansas City survey, an additional 49 cases were found that presented this type of pulmonary calcification. Fifteen of these were previously reported by Zwerling and Palmer (*14*). Twenty-nine of the forty-nine cases were found in approximately 13,000 children and adults living in Kansas and Missouri. Nineteen cases were found among nearly 15,000 student nurses who studied in 72 training schools in 10 cities throughout the United States. One case was that of a young man whose residence was not stated. The age of the 49 ranged from 10 to 75 years. Two cases were found in siblings.

Forty-six cases were tested with tuberculin and histoplasmin, and again this type of calcification was found most frequently in histoplasmin reactors (table 4). The percentage that reacted only to his-

TABLE 4.—*Cases of disseminated pulmonary calcification discovered in sources other than the Kansas City survey, according to reaction to histoplasmin and tuberculin*

Skin reaction	Number	Percentage
H+T-	35	76.1
H+T+	9	19.6
H-T+	0	0
H-T-	[1] 2	4.3
Total	46	100.0

[1] Also doubtful reaction to histoplasmin (1 case).

toplasmin was 76.1; none reacted only to tuberculin. The percentage that reacted to both skin tests was 19.6; and 4.3 percent reacted to neither, although one had a doubtful reaction to histoplasmin. Those who showed positive reactions to histoplasmin totaled 95.7 percent.

Only 1 of the 49 cases had a lesion other than disseminated calcification, demonstrated by the roentgenogram. In this instance, obliteration of the left costophrenic sulcus was present, and there were also minimal changes suggestive of thickened pleura overlying the right apex.

When all available cases are combined, 113 instances of disseminated pulmonary calcification have been found in approximately 45,000 persons. One hundred and eight of these were tested with both tuberculin and histoplasmin. Two were tested only with tuberculin and did not react. The results of these tests are presented in table 5.

TABLE 5.—*Cases of disseminated pulmonary calcification collected from all sources, according to reaction to histoplasmin and tuberculin*

Skin reaction	Total	Multiple bilateral type		Miliary type	
		With hilar calcification	With no hilar calcification	With hilar calcification	With no hilar calcification
H+T−	93	45	15	16	17
H+T+	11	5	1	3	2
H−T+	0	0	0	0	0
H−T−	[1] 4	0	1	1	[1] 2
Not tested	5	1	1	[2] 2	[2] 1

[1] Also doubtful reaction to histoplasmin (1 case).
[2] 1 case negative to tuberculin, not tested with histoplasmin.

No case was found with a positive tuberculin reaction alone, whereas 86.1 percent were found in those who reacted to histoplasmin alone. Of the 108 cases, 3.7 percent reacted to neither skin test, and 10.2 percent reacted to both. Therefore, 96.3 percent of the cases showing this type of calcification reacted to histoplasmin, and only 10.2 percent reacted to tuberculin.

Of the total group of 113 cases, 69, or 61.1 percent, were of the multiple bilateral type; while only 44, or 38.9 percent, were of the miliary type. Calcifications were noted in the hilar structures in 73.5 percent of the former type, whereas only 50.0 percent of the latter type showed such calcifications. No significant differences were observed in the skin reactions to histoplasmin or tuberculin in these two groups, regardless of the presence or absence of calcifications in the hilar areas.

From those histories of residence that were available, it was learned

that over 75 percent of the individuals with disseminated pulmonary calcification had lived all or most of their lives in areas where Palmer found high histoplasmin reaction rates.

SUMMARY

One hundred and thirteen instances of disseminated pulmonary calcification are reported, and the skin reactions to tuberculin and histoplasmin are given.

From 64 cases of such calcification, found in a survey of 15,980 school children in Kansas City, Mo., the following observations were made:

1. The frequency among the whites rose steadily from none in the age group under-4-years to 10 per 1,000 in the age group 16–18.
2. Negroes showed less calcification of this type than whites—1.2 per 1,000 in the former and 4.5 per 1,000 in the latter.
3. A definite familial relationship was noted.
4. Only 1 of the 64 cases showed roentgenographic abnormalities other than disseminated calcification.
5. In no instance was such calcification noted among those who reacted only to tuberculin; but in 58 instances, or 93.5 percent of the group, disseminated calcification was noted among reactors to histoplasmin alone. In two instances, or 3.2 percent, the children reacted to tuberculin and histoplasmin, and in two other instances, to neither antigen. Of this group, 96.7 percent reacted to histoplasmin.

From other sources, 49 additional instances of disseminated calcification were found. Of these, 76.1 percent reacted only to histoplasmin, and none only to tuberculin. The percentage of cases that reacted to both antigens was 19.6, and 4.3 percent reacted to neither antigen. The percentage of cases that reacted to histoplasmin was 95.7.

Of the 113 cases, 108 received tests with tuberculin and histoplasmin. One hundred and four cases, or 96.3 percent, reacted to histoplasmin, while only 4 had negative reactions to this antigen. None reacted only to tuberculin. This latter finding appears to be strong evidence that disseminated calcifications are not frequently caused by tubercle bacilli, but probably by the agent producing sensitivity to histoplasmin.

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SPELEOTOMY

G. Le Carboulec devotes an exhaustive monograph (Paris 1945, Imprimerie Saint-Denis, Niort) to the technique of speleotomy, the "last word" in the surgical therapy of tuberculosis. This monograph covers current knowledge on the subject, the historical background, concepts of bronchial and cavitary anatomy, detection of cavities, operative and postoperative techniques, when the operation is indicated and its limits, and the results which have been obtained. The author reports on the experience of Bernou, leader of the Chateaubriant school, who has contributed, to a great extent, to the promotion of this type of surgical intervention which is still restricted to residual cavities under thoracoplasty. He concludes from his 21 observations that speleotomy should take a relatively important place in the treatment of cavities, when thoracoplasty and Monaldi's drainage have failed.

Aulanier and Liron describe the success of speleotomy in patients at the limit of operability (*Soc. d'et scient. de la tub.*, March 10, 1945).

DEATHS DURING WEEK ENDED DEC. 7, 1946

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Dec. 7, 1946	Correspond-ing week, 1945
Data for 93 large cities of the United States:		
Total deaths	9,716	9,945
Average for 3 prior years	9,910	
Total deaths, first 49 weeks of year	441,814	430,644
Deaths under 1 year of age	701	640
Average for 3 prior years	631	
Deaths under 1 year of age, first 49 weeks of year	32,620	29,714
Data from industrial insurance companies:		
Policies in force	67,332,394	67,207,277
Number of death claims	11,963	13,085
Death claims per 1,000 policies in force, annual rate	9.3	10.1
Death claims per 1,000 policies, first 49 weeks of year, annual rate	9.4	10.0

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED DECEMBER 14, 1946

Summary

A total of 197 cases of poliomyelitis was reported for the week, as compared with 242 last week, 115 for the corresponding week last year, and a 5-year (1941–45) median of 86. Slight increases were reported in the New England, South Central, and Mountain areas, probably in most instances due to delayed reports. Of the 16 States reporting currently 5 or more cases, 9 reported an increase (63 to 87 cases), 5 showed a decline (87 to 50), while 2 showed no change. States reporting the largest number of cases are California 21, Illinois 18, New York and Texas 14 each, and Ohio and North Dakota 10 each. The cumulative total since March 16 is 24,489, as compared with 13,161 and 18,844, respectively, for the corresponding periods of last year and 1944, and a 5-year median for the period of 12,017.

Only slight increases were reported in the incidence of influenza. A total of 2,875 cases was reported, as compared with 2,813 last week and a 5-year median of 2,995. States reporting more than 100 cases are as follows (last week's figures in parentheses): Texas 1,365 (1,343), South Carolina 498 (423), Virginia 255 (422), Arizona 254 (261), Oklahoma 103 (15). The cumulative total since July 27 (approximate date of seasonal low for this disease) is 26,977, as compared with 240,750 for the corresponding period last year and a 5-year median of 27,484.

Four cases of psittacosis were reported in Michigan during the week.

Cumulative figures above those for last year for other diseases listed in the following table are Rocky Mountain spotted fever, tularemia, and undulant fever. The total to date for amebic dysentery is slightly above, but the cumulative totals for bacillary and undefined dysentery are below the corresponding figures for last year.

Deaths recorded during the week in 93 large cities of the United States totaled 9,612, as compared with 9,716 last week, 10,228 and 9,365, respectively, for the corresponding weeks of 1945 and 1944, and a 3-year (1943–45) average of 10,393. The total number recorded for these cities to date is 451,426, as compared with 449,872 for the corresponding period last year.

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Telegraphic morbidity reports from State health officers for the week ended Dec. 14, 1946, and comparison with corresponding week of 1945 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1941–45	Week ended—		Median 1941–45	Week ended—		Median 1941–45	Week ended—		Median 1941–45
	Dec. 14, 1946	Dec. 15, 1945		Dec. 14, 1946	Dec. 15, 1945		Dec. 14, 1946	Dec. 15, 1945		Dec. 14, 1946	Dec. 15, 1945	
NEW ENGLAND												
Maine	5	5	0	3	3	1	268	1	13	0	1	1
New Hampshire	0	0	0	1	149	1	55	34	4	0	0	0
Vermont	0	0	0	------	150	------	148	5	4	0	0	0
Massachusetts	25	10	5	------	------	------	239	152	152	3	3	6
Rhode Island	0	0	1	------	8	8	13	2	4	0	1	1
Connecticut	0	5	0	2	26	5	54	14	14	2	1	2
MIDDLE ATLANTIC												
New York	26	8	20	[1] 4	[1] 45	[1] 12	179	266	200	8	15	17
New Jersey	7	2	4	5	61	13	109	17	17	3	6	6
Pennsylvania	17	11	9	7	58	3	551	436	506	0	7	7
EAST NORTH CENTRAL												
Ohio	25	24	15	8	86	13	128	10	52	2	4	4
Indiana	23	7	3	4	595	15	11	3	21	3	2	1
Illinois	19	8	8	4	56	10	11	214	83	2	7	7
Michigan [3]	7	11	6	2	6	7	77	229	86	2	3	3
Wisconsin	9	3	2	22	388	49	28	24	129	0	1	3
WEST NORTH CENTRAL												
Minnesota	10	9	8	------	9	3	4	4	8	3	2	0
Iowa	1	10	3	2	65	------	7	6	44	2	0	0
Missouri	12	6	5	2	62	4	------	33	8	1	2	3
North Dakota	5	2	2	14	1,244	12	------	------	2	1	0	0
South Dakota	3	0	2	------	2	------	3	1	3	0	0	0
Nebraska	2	2	2	------	86	31	3	3	12	2	0	0
Kansas	9	7	7	3	11,229	48	4	41	41	1	0	2
SOUTH ATLANTIC												
Delaware	1	0	0	------	17	------	1	------	3	1	0	0
Maryland [3]	7	16	9	3	59	9	19	9	11	0	8	0
District of Columbia	0	0	0	------	22	3	14	2	2	0	0	0
Virginia	9	9	9	255	4,601	286	34	64	64	3	4	4
West Virginia	4	3	5	49	3,808	84	12	1	22	0	1	2
North Carolina	9	36	17	------	------	6	133	20	20	2	2	2
South Carolina	11	8	5	498	2,659	460	60	13	13	0	1	1
Georgia	5	19	14	19	1,000	80	27	12	21	2	0	1
Florida	15	11	8	20	8	8	22	4	4	0	0	1
EAST SOUTH CENTRAL												
Kentucky	24	11	5	------	89,363	13	1	211	13	2	3	2
Tennessee	5	19	10	27	204	54	6	8	23	1	0	1
Alabama	19	25	17	44	649	98	34	2	2	1	4	1
Mississippi [3]	5	12	12	------	------	------	------	------	------	2	2	2
WEST SOUTH CENTRAL												
Arkansas	9	13	13	79	644	150	9	14	22	0	3	3
Louisiana	8	22	9	2	47	3	------	7	5	1	1	1
Oklahoma	8	6	9	103	684	137	2	5	8	2	0	0
Texas	16	74	58	1,365	11,259	1,702	58	47	51	6	1	3
MOUNTAIN												
Montana	1	0	1	20	193	19	70	3	28	0	0	0
Idaho	0	0	0	8	279	1	2	73	11	1	1	0
Wyoming	0	1	0	------	66	66	1	10	8	0	0	0
Colorado	8	7	7	26	367	54	7	12	12	1	0	1
New Mexico	1	0	2	4	8	4	32	1	1	0	1	1
Arizona	5	7	2	254	1,163	110	30	2	7	1	0	0
Utah [3]	0	0	0	2	17,028	9	7	29	29	0	0	0
Nevada	0	0	0	------	------	------	------	------	1	0	0	0
PACIFIC												
Washington	3	5	7	------	226	12	23	220	52	0	1	3
Oregon	0	3	8	1	122	21	23	20	55	0	1	1
California	18	37	28	13	25	52	78	297	237	9	8	8
Total	396	474	416	2,875	148,914	2,995	2,592	2,581	4,425	70	92	108
50 weeks	15,574	17,746	14,995	217,174	309,648	309,648	658,023	123,670	587,903	5,535	7,710	7,710
	(27th) July 5–11			(30th) July 26–Aug. 1			(35th) Aug. 30–Sep. 5			(37th) Sep. 13–19		
	5,946	10,849	8,508	26,977	240,750	27,494	17,940	21,111	27,635	869	1,215	1,215

[1] New York City only.
[3] Period ended earlier than Saturday.

Telegraphic morbidity reports from State health officers for the week ended Dec. 14, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever [4]		
	Week ended—		Median 1941–45	Week ended—		Median 1941–45	Week ended—		Median 1941–45	Week ended—		Median 1941–45
	Dec. 14, 1946	Dec. 15, 1945		Dec. 14, 1946	Dec. 15, 1945		Dec. 14, 1946	Dec. 15, 1945		Dec. 14, 1946	Dec. 15, 1945	
NEW ENGLAND												
Maine	0	1	0	37	24	24	0	0	0	3	0	1
New Hampshire	1	0	0	5	0	5	0	0	0	0	0	0
Vermont	3	1	1	3	10	2	0	0	0	0	0	0
Massachusetts	8	2	1	176	121	251	0	0	0	2	1	3
Rhode Island	1	1	0	11	12	12	0	0	0	0	0	0
Connecticut	1	1	1	28	29	40	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York	14	16	8	306	296	301	0	0	0	2	2	5
New Jersey	4	0	1	70	46	85	0	0	0	0	1	1
Pennsylvania	3	0	1	169	174	194	0	0	0	5	2	4
EAST NORTH CENTRAL												
Ohio	10	2	2	257	326	269	1	0	0	2	2	2
Indiana	6	0	0	58	54	54	0	0	0	2	0	0
Illinois	18	14	2	118	145	164	0	0	0	1	1	2
Michigan [2]	6	3	1	161	209	189	0	0	0	0	3	3
Wisconsin	8	3	0	56	108	135	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	4	0	1	37	42	67	0	0	0	0	0	0
Iowa	5	1	1	18	24	55	0	0	1	0	0	1
Missouri	4	7	1	33	59	59	1	0	0	0	1	1
North Dakota	10	0	0	11	8	13	0	0	0	3	0	0
South Dakota	5	1	1	4	4	29	0	0	0	2	0	0
Nebraska	6	0	1	19	22	27	0	0	0	0	0	0
Kansas	2	0	1	28	78	78	0	1	1	0	0	0
SOUTH ATLANTIC												
Delaware	0	0	0	7	3	5	0	0	0	1	0	0
Maryland [2]	2	0	0	35	40	46	0	0	0	2	1	1
District of Columbia	0	0	0	10	13	14	0	0	0	0	0	1
Virginia	1	3	1	42	94	65	0	0	0	2	0	0
West Virginia	0	0	0	23	47	47	0	0	0	0	0	0
North Carolina	1	2	2	33	61	67	0	0	0	1	0	0
South Carolina	0	1	1	9	8	12	0	0	0	0	4	1
Georgia	0	0	0	18	32	32	0	0	0	0	1	1
Florida	4	3	1	10	8	8	0	0	0	0	3	2
EAST SOUTH CENTRAL												
Kentucky	0	2	2	43	65	65	0	0	1	2	1	1
Tennessee	5	0	0	21	35	47	0	0	0	1	0	1
Alabama	2	2	0	8	30	28	0	2	0	2	1	1
Mississippi [2]	5	3	1	6	35	16	0	1	0	1	1	1
WEST SOUTH CENTRAL												
Arkansas	3	0	1	5	18	11	0	0	0	2	3	2
Louisiana	3	8	0	6	23	8	0	0	0	0	5	3
Oklahoma	2	0	0	11	18	22	1	2	2	0	3	1
Texas	14	4	3	33	105	55	0	0	0	2	9	6
MOUNTAIN												
Montana	0	2	0	8	9	19	0	0	0	8	0	0
Idaho	1	0	0	8	13	13	0	0	0	2	1	1
Wyoming	0	0	0	2	7	7	0	0	0	0	0	0
Colorado	1	0	0	33	43	35	0	0	0	0	0	0
New Mexico	2	0	0	14	17	8	0	0	0	0	0	1
Arizona	2	1	1	16	15	9	0	0	0	1	1	1
Utah [2]	0	0	0	31	29	32	0	0	0	0	2	0
Nevada	0	0	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	9	11	8	57	38	38	0	0	0	1	1	0
Oregon	0	5	0	30	34	34	0	0	0	1	0	0
California	21	15	9	143	245	171	0	0	0	8	3	4
Total	197	115	86	2,267	2,882	3,015	3	6	9	49	53	70
50 weeks	24,055	13,558	12,319	109,152	167,781	134,742	330	339	724	3,925	4,773	5,376
Seasonal low week [3]	(11th) Mar. 15–21			(32nd) Aug. 9–15			(35th) Aug. 30–Sep. 5			(11th) Mar. 15–21		
Total since low	24,489	13,161	12,017	22,357	33,963	33,963	51	66	108	3,450	4,149	4,791

[2] Period ended earlier than Saturday.
[3] Dates between which the approximate low week ends. The specific date will vary from year to year
[4] Including paratyphoid fever reported separately, as follows: Maine 1; Massachusetts 2 (salmonella infection); New York 1; Ohio 2; Virginia 1; Arkansas 1.

Telegraphic morbidity reports from State health officers for the week ended Dec. 14, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Whooping cough: Week ended— Dec. 14, 1946	Whooping cough: Week ended— Dec. 15, 1945	Whooping cough: Median 1941–45	Week ended Dec. 14, 1946: Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis, infectious	Rocky Mt. spotted fever	Tularemia	Typhus fever endemic	Undulant fever
NEW ENGLAND											
Maine	18	40	39								
New Hampshire	25	12	11								
Vermont	12	20	20								2
Massachusetts	170	164	164								1
Rhode Island	16	24	24								
Connecticut	48	58	58		1						1
MIDDLE ATLANTIC											
New York	290	286	286	1	6		1				9
New Jersey	183	184	152								
Pennsylvania	274	129	129		1				1		10
EAST NORTH CENTRAL											
Ohio	112	119	119	6					6	1	5
Indiana	16	15	15			2	1		11		
Illinois	114	76	76	4			1		12		4
Michigan [2]	208	211	211						7		2
Wisconsin	273	93	177								8
WEST NORTH CENTRAL											
Minnesota	16	7	27	3							1
Iowa	18	19	19				1				15
Missouri	19	5	12						16		4
North Dakota		8	6				1				1
South Dakota		2	2			4					2
Nebraska	6	1	4								
Kansas	10	19	31						8		2
SOUTH ATLANTIC											
Delaware	1	5	5								
Maryland [3]	74	42	53					([3])	4		
District of Columbia	12	5	5						2		
Virginia	38	43	43			67			6		2
West Virginia	82	22	22								
North Carolina	76	46	89								
South Carolina	42	38	29		9				1	1	
Georgia	7	9	9	2	2				2	8	2
Florida	21	5	10				1		1	7	2
EAST SOUTH CENTRAL											
Kentucky	41	22	28					1	2		2
Tennessee	38	9	12						8		3
Alabama	50	21	15						1	5	3
Mississippi [2]									8		5
WEST SOUTH CENTRAL											
Arkansas	12	6	14				1		1		
Louisiana		2	2	3						2	6
Oklahoma	11	5	5	6					2		
Texas	216	139	139	10	241	55				7	12
MOUNTAIN											
Montana	3		10								1
Idaho	5	10	3								
Wyoming	6		6						1		
Colorado	16	14	14								1
New Mexico	24		3		1	4					
Arizona	13	6	10			58					
Utah [2]	1	13	19								1
Nevada											
PACIFIC											
Washington	30	49	49								1
Oregon	5	7	16	1							1
California	62	120	120	4	4		1				4
Total	2,664	2,125	2,125	40	265	190	8	1	90	31	123
Same week, 1945	2,125			50	484	165	7	1	86	76	64
Average, 1943–45	2,000			36	473	149	6	[4] 0	37	[4] 80	
50 weeks: 1946	96,419			2,350	16,007	6,297	600	[4] 569	1,052	3,294	5,161
1945	120,814			1,885	24,069	10,341	612	466	765	5,046	4,733
Average, 1943–45	129,040		[4] 172,829	1,920	21,835	8,860	684	[4] 453	723	[4] 4,393	

[2] Period ended earlier than Saturday.
[3] Delayed report: Maryland, Rocky Mountain spotted fever, 1 October case.
[4] 5-year median, 1941–45.

Anthrax: Connecticut 1 case. *Psittacosis:* Michigan 4 cases.

WEEKLY REPORTS FROM CITIES [1]

City reports for week ended Dec. 7, 1946

This table lists the reports from 84 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0	------	0	55	0	0	1	3	0	0	5
New Hampshire:												
Concord	0	0	------	0	-------	0	0	0	0	0	0	------
Vermont:												
Barre	0	0	------	0	-------	0	0	0	0	0	0	------
Massachusetts:												
Boston	9	0	------	0	10	1	18	3	25	0	1	36
Fall River	0	0	------	0	1	0	1	0	1	0	0	1
Springfield	1	0	------	0	6	0	0	0	1	0	0	27
Worcester	0	0	------	0	-------	0	6	0	3	0	0	18
Rhode Island:												
Providence	0	0	2	0	11	0	1	0	7	0	0	15
Connecticut:												
Bridgeport	0	0	------	0	1	0	0	0	1	0	0	------
Hartford	0	0	------	0	-------	0	1	0	1	0	0	7
New Haven	0	0	------	0	17	0	1	0	0	0	0	------
MIDDLE ATLANTIC												
New York:												
Buffalo	2	0	------	0	-------	0	3	0	5	0	0	------
New York	28	1	4	1	22	2	41	14	55	0	1	38
Rochester	0	0	------	0	-------	1	2	0	8	0	0	2
Syracuse	0	0	------	0	-------	1	2	0	13	0	0	15
New Jersey:												
Camden	1	0	------	0	-------	0	2	0	0	0	0	4
Newark	0	0	2	0	3	0	8	0	5	0	0	29
Trenton	0	0	------	0	22	0	2	0	0	0	0	------
Pennsylvania:												
Philadelphia	4	0	6	2	4	2	14	1	26	0	0	39
Pittsburgh	2	0	------	0	261	0	12	0	15	0	0	11
Reading	0	0	------	0	1	0	2	0	0	0	0	6
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	0	0	------	0	1	0	2	[2] 0	9	0	1	8
Cleveland	0	0	4	1	67	1	5	2	16	0	0	7
Columbus	1	0	------	0	3	1	0	0	12	0	0	20
Indiana:												
Fort Wayne	0	0	------	0	-------	0	3	0	0	0	0	------
Indianapolis	3	0	------	0	2	0	4	0	7	0	0	14
South Bend	0	0	------	0	-------	0	0	0	5	0	0	------
Terre Haute	0	0	------	0	-------	0	0	0	0	0	0	------
Illinois:												
Chicago	1	0	------	0	4	1	19	9	50	0	0	39
Michigan:												
Detroit	5	0	1	0	6	0	11	1	36	0	0	61
Flint	0	0	------	0	-------	0	0	0	2	0	0	2
Grand Rapids	0	0	------	0	-------	0	1	0	11	0	0	12
Wisconsin:												
Kenosha	0	0	------	0	-------	0	0	0	1	0	0	------
Milwaukee	0	0	------	0	18	0	0	1	13	0	0	105
Racine	0	0	------	0	-------	0	0	1	6	0	0	16
Superior	0	0	------	0	-------	0	0	0	0	0	0	------
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0	------	0	-------	0	0	1	0	0	0	4
Minneapolis	0	0	------	0	3	0	2	0	22	0	0	1
Missouri:												
Kansas City	1	0	------	0	-------	0	6	3	2	0	0	5
St. Joseph	0	0	------	0	-------	0	0	0	1	0	0	------
St. Louis	6	0	1	1	-------	0	16	2	8	0	0	7

[1] In some instances the figures include nonresident cases.
[2] Correction: Cincinnati, week ended November 2, poliomyelitis, 1 case (instead of 34). Rates: East North Central, 27.6; total, 23.0.

City reports for week ended Dec. 7, 1946—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
Nebraska:												
Omaha	1	0	------	0	3	0	3	1	5	0	0	6
Kansas:												
Topeka	0	0	------	0	1	0	0	2	0	0	0	1
Wichita	0	0	------	0	------	0	3	0	3	0	0	2
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0	------	0	1	0	2	0	2	0	0	4
Maryland:												
Baltimore	20	0	------	0	5	1	10	0	13	0	0	41
Cumberland	0	0	------	0	4	0	0	0	0	0	0	------
Frederick	0	0	------	0	4	0	0	0	1	0	0	------
District of Columbia:												
Washington	0	0	------	0	------	3	5	2	2	0	0	4
Virginia:												
Lynchburg	0	0	------	0	------	0	0	0	0	0	0	------
Richmond	0	0	1	1	6	0	5	0	2	0	0	------
Roanoke	0	0	------	0	------	0	0	0	1	0	0	------
West Virginia:												
Wheeling	0	0	------	0	------	0	0	0	0	0	0	1
North Carolina:												
Raleigh	0	0	------	0	------	0	2	1	0	0	0	4
Wilmington	1	0	------	0	3	0	2	0	0	0	0	------
Winston-Salem	0	0	------	0	37	0	0	0	0	0	0	1
South Carolina:												
Charleston	0	0	5	0	------	0	0	0	0	0	0	------
Georgia:												
Atlanta	1	0	2	1	7	0	2	0	2	0	0	5
Brunswick	0	0	------	0	------	0	1	0	0	0	0	------
Savannah	0	0	------	0	7	0	0	0	1	0	0	------
Florida:												
Tampa	3	0	------	0	------	0	1	0	0	0	0	------
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	1	0	------	2	3	0	4	2	0	0	0	12
Nashville	0	0	------	2	------	0	3	0	1	0	0	------
Alabama:												
Birmingham	1	0	3	1	1	0	3	0	2	0	0	------
Mobile	4	0	2	1	------	0	0	0	0	0	1	1
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	2	0	------	0	4	0	0	0	2	0	0	------
Louisiana:												
New Orleans	0	0	1	1	4	0	5	1	1	0	0	1
Shreveport	0	0	------	0	------	1	6	2	0	0	1	------
Texas:												
Dallas	2	0	------	0	3	0	2	1	1	0	0	1
Galveston	0	0	------	0	------	0	1	0	0	0	0	------
Houston	0	0	------	0	------	1	2	2	1	0	0	------
San Antonio	0	0	------	0	1	0	8	0	0	0	0	6
MOUNTAIN												
Montana:												
Great Falls	0	0	------	0	2	0	0	0	0	0	0	2
Helena	0	0	------	0	------	0	0	0	0	0	0	------
Missoula	0	0	------	0	------	0	2	0	0	0	0	1
Colorado:												
Denver	1	0	8	0	2	1	2	0	13	0	0	5
Pueblo	0	0	------	0	------	0	1	0	0	0	0	------
Utah:												
Salt Lake City	0	0	------	0	4	0	2	0	4	0	0	------

City reports for week ended Dec. 7, 1946—Continued

Division, State, and city	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle	1	0		0	3	1	8	0	4	0	0	9
Spokane	0	0	1	0	3	1	3	0	3	0	0	
Tacoma	0	0		0		0	0	0	2	0	0	
California:												
Los Angeles	4	0	3	0	7	2	4	4	24	0	0	16
Sacramento	0	0		0		0	0	0	4	0	0	3
San Francisco	0	0	1	0	3	2	6	1	7	0	0	
Total	106	1	47	14	631	23	278	58	471	0	5	680
Corresponding week, 1945	64		350	42	781		385		681	0	8	637
Average, 1941-45	88		856	[3] 73	[4] 736		[3] 487		846	0	13	721

[3] 3-year average, 1943-45.
[4] 5-year median, 1941-45.
Dysentery, amebic.—Cases: New York 5; Chicago 1; Nashville 2.
Dysentery, bacillary.—Cases: New York 1; Detroit 1; Los Angeles 3.
Dysentery, unspecified.—Cases: San Antonio 3.
Tularemia.—Cases: Cincinnati 1; Cleveland 1; Indianapolis 1; Chicago 1; St. Louis 4; New Orleans 1.
Typhus fever, endemic.—Cases: Tampa 2; Nashville 1; Birmingham 3; New Orleans 2; Dallas 1; Los Angeles 2.

Rates (annual basis) per 100,000 population, by geographic groups, for the 84 cities in the preceding table (estimated population, 1943, 33,891,000)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England	26.1	0.0	5.2	0.0	264	2.6	60.1	10.5	110	0.0	2.6	285
Middle Atlantic	17.1	0.5	5.6	1.4	145	2.8	40.7	6.9	59	0.0	0.5	67
East North Central	6.1	0.0	3.1	0.6	59	1.8	27.6	8.6	103	0.0	0.6	174
West North Central	18.0	0.0	2.3	2.3	16	0.0	67.6	20.3	92	0.0	0.0	59
South Atlantic	41.9	0.0	13.4	3.3	124	6.7	50.2	5.0	40	0.0	0.0	100
East South Central	35.4	0.0	20.5	35.4	24	0.0	59.0	11.8	18	0.0	5.9	77
West South Central	11.5	0.0	2.9	2.9	34	5.7	68.9	17.2	14	0.0	2.9	23
Mountain	8.5	0.0	68.4	0.0	68	8.5	59.8	0.0	145	0.0	0.0	68
Pacific	7.9	0.0	7.9	0.0	25	9.5	33.2	7.9	70	0.0	0.0	44
Total	16.4	0.2	7.3	2.2	97	3.5	42.9	8.9	78	0.0	0.8	105

TERRITORIES AND POSSESSIONS

Hawaii Territory

Plague (rodent).—Under date of December 9, 1946, rodent plague infection was reported on September 20, 1946, in District 14B, Makawao, Island of Maui, T. H.

CANADA

Provinces—Communicable diseases—Week ended November 23, 1946.—During the week ended November 23, 1946, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		16		240	382	21	34	72	99	870
Diphtheria			2	42	11	3	1	7	2	68
Dysentery:										
Amebic					8					8
Bacillary				1						1
German measles					8	1	1	5	5	20
Influenza		15			3		1		13	32
Measles		219		94	56	20	217	117	78	801
Meningitis, meningococcus				1	6		1	1	2	11
Mumps				60	242	31	65	27	125	550
Poliomyelitis		1		7	10					18
Scarlet fever		6	15	139	98	9	3	7	8	285
Tuberculosis (all forms)		4	8	112	74	21	5	12	80	316
Typhoid and paratyphoid fever				18	5	1			2	26
Undulant fever				1						1
Venereal diseases:										
Gonorrhea		12	8	182	126	34	41	33	78	514
Syphilis	1	20	7	84	91	28	20	12	49	312
Other forms				1					2	3
Whooping cough		11		55	71	11	5	3	30	186

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Plague

Madagascar.—For the period November 11–20, 1946, 10 cases of plague were reported in Madagascar.

Palestine—Jaffa.—On December 2, 1946, 1 fatal case of plague was reported in Jaffa, Palestine.

Peru.—During the month of October 1946, 19 cases of plague with 2 deaths were reported in Huancabamba Province, Piura Department, and 1 case of plague was reported in Chancay Province, Lima Department, Peru.

Smallpox

Malay States (Federated).—For the week ended December 7, 1946, 262 cases of smallpox were reported in the Federated Malay States.

Venezuela.—For the week ended November 30, 1946, 157 cases of smallpox (alastrim) were reported in Venezuela, including 131 cases reported in Sucre State, 7 cases reported in Anzoategui State, 7 cases reported in Aragua State, and 12 cases reported in Cojedes State.

Typhus Fever

Eritrea.—Typhus fever has been reported in Eritrea as follows: Weeks ended—November 16, 1946, 59 cases, 2 deaths; November 23, 1946, 85 cases, 10 deaths.

Yellow Fever

French Equatorial Africa—Carnot.—On December 7, 1946, 4 cases of yellow fever among the natives were reported confirmed in Carnot, French Equatorial Africa.

X

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

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Public Health Reports

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IN THIS ISSUE

Two measures of national significance in public health were enacted by Congress during the past year—the Hospital Survey and Construction Act and the National Mental Health Act. Both programs are now in the planning stage. They are expected to become active during 1947, after the funds have been appropriated.

This issue of PUBLIC HEALTH REPORTS presents discussions of these programs by the men directly responsible for their administration. This issue also presents a review of recent State legislation pertinent to the hospital program.

The Editors

Public Health Reports

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THE RELATION OF THE NATIONAL MENTAL HEALTH ACT TO STATE HEALTH AUTHORITIES [1]

By Dr. Robert H. Felix, *Chief, Mental Hygiene Division, United States Public Health Service*

This is indeed a significant occasion. For the first time in the history of the United States Public Health Service, the State and Territorial health officers are meeting with the State mental health authorities to discuss ways and means of jointly working toward improving mental health. It means that the problem of mental illness is finally being attacked in a realistic manner commensurate with its seriousness and extent—in short, as a public health problem. When one considers the prevalence of mental illness and its cost to the community in terms of loss of productivity and the expense of care, let alone in terms of human suffering, the need is clear for a public health approach to the problem of mental illness.

It has been conservatively estimated that more than 8 million persons in this country are suffering from some form of mental illness. Some 600,000 are now in mental hospitals, occupying more than half the hospital beds in the United States; and every year a quarter of a million new patients are admitted. The figures on hospital population by no means represent the number in need of such care since in many States admissions are determined by the availability of beds rather than by the need.

Until now, a concerted public attack upon the problem of mental illness has been hindered by the same factors that held back an effective attack on syphilis—the stigma attached by society, with the consequent reluctance to admit its presence and to seek medical aid

[1] Presented before the meeting of the State and Territorial Health Officers at Washington, D. C. December 3, 1946.

early. There is considerable evidence, however, of an improved attitude on the part of the public toward mental illness, which will not only permit but demand an effective program. Perhaps the most significant evidence of the public's concern is the recent passage by Congress of the National Mental Health Act, thus giving open recognition to the seriousness of the problem and making possible, for the first time in our history, a comprehensive, long-range program for the improvement of the mental health of the nation.

The National Mental Health Act amends the Public Health Service Act (Public Law 410, 79th Cong.) and follows generally the same legislative pattern in the field of mental health as do the provisions in the Public Health Service Act regarding other public health problems.

The act is aimed at bringing about direct action in three interrelated fields: Increased research in nervous and mental disorders, the training of mental health personnel, and the improvement and expansion of community mental health services. No funds are available for the construction of mental hospitals or for financing the institutional care of the mentally ill.

Research.—Under the National Mental Health Act, the United States Public Health Service is authorized to make grants-in-aid for research directly to universities, hospitals, laboratories, and other public and private institutions, and to qualified individuals. Research projects must first be approved by the National Advisory Mental Health Council, which is composed of six persons selected without regard to civil-service laws from the leading authorities in the field of mental health. This authorization should do much to stimulate research which otherwise might remain in the idea stage.

The act also authorizes the establishment of a National Institute of Mental Health in the Washington area, where coordinated studies will be conducted in the many sciences bearing upon the problem of mental health. There will be a full-time staff plus advanced students representing all the disciplines which may reasonably be expected to help solve the enigmas of mental illness. For clinical observation, the institute will include a hospital unit, the patients to be selected on the basis of the studies being conducted.

The law further provides for the appointment of research fellows in the various sciences related to mental health. The fellowship program will make it financially possible for capable students to contribute to science while enhancing their own value as professional workers in the field of mental health.

Training.—The shortage of well-trained personnel in the mental health field is one of the most serious handicaps to the development of an adequate mental health program. To promote training in this

field, the act authorizes the Public Health Service to make grants to public and other nonprofit institutions for developing and improving their training facilities. In this way, institutions that already provide training in mental health fields can expand to accommodate more students, and potential training centers—in hospitals, medical and other schools—can be developed. Grants may not be used, however, for the construction of buildings.

Training stipends will also be available to selected students in psychiatry, psychology, psychiatric social work, and psychiatric nursing. The number of trainees who may receive stipends is to be determined by the National Advisory Mental Health Council.

Grants-in-aid to States.—The third category of mental health activity which the act seeks to promote is the improvement of mental health services in local communities through grants-in-aid to States. It is this aspect of the national program in particular which is to be discussed in detail here. Under this legislation, the amount authorized annually for general health purposes is increased by $10,000,000, this sum to be made available to States for the development and expansion of mental health programs at the State and community level.

Of the total sum appropriated for this purpose, allocations will be made to the States on the basis of population, the extent of the mental health problem, and the financial need of each State.

Responsibility for the development and execution of the State plans in the field of mental health is vested in the State mental health authority, which functions in the mental health program as does the State health authority in other health programs. In the act, the State mental health authority is defined as "the State health authority, except that, in the case of any State in which there is a single State agency other than the State health authority charged with responsibility for administering the mental health program of the State, it means such other State agency."

In order that there may be no confusion as to the intent of Congress when it defined the State mental health authority, it may be pertinent at this point to quote from the Senate and House committee reports: "* * * in some States there is a State agency, separate and apart from the State health authority, which has primary responsibility for the preventive mental hygiene activities and the other activities related to the State's mental health program. Your committee does not contemplate by the new definition to include those State agencies whose activities in the mental health field are restricted to jurisdiction over mental institutions and their patients. It does contemplate substitution of the other State agency for the State

health authority where the former is really the State health authority in the field of mental health."

As in obtaining grants for other public health programs, in order to secure a grant under the National Mental Health Act, the State mental health authority must submit a plan to the Surgeon General for the development of mental health services in his State, together with budget estimates. When the State health authority is the designated mental health authority, a section on the mental health program need merely be included in the over-all State health plans. When another agency is the designated mental health authority, the plan for the mental health program is submitted directly to the district office of the United States Public Health Service for review and comment. You realize how necessary it will be for the State mental health authority to cooperate with the State health authority and with other interested State and local agencies in the preparation of plans, in order that all existing and potential resources may be utilized. Funds allocated to States for mental health programs must be expended for that purpose.

Demonstrations.—In order to encourage the further development of mental health programs in the States, the act authorizes that not more than 1 million dollars of the 10-million-dollar increase in general health funds can be utilized to enable the Surgeon General to provide demonstrations and to train personnel for State and local health work and to meet the cost of pay, allowances, and traveling expenses of commissioned officers and other personnel of the Service detailed to assist States. Because of the shortage of personnel, it will be necessary to locate demonstrations in strategic areas only.

In addition to the demonstrations, the United States Public Health Service, through its consultants assigned to the district offices, will offer consultative services to the States in developing their mental health programs.

What types of activities should be included in the plans of the State mental health authority in order to develop an adequate program for each State, utilizing the Federal assistance now made available under the Mental Health Act?

Of course not all of the activities to be described here can become immediate realities in all States. Nor need they be adopted *in toto* by every State. Programs naturally will differ with the special needs of each State. A program which is best for one State may not prove useful to another. Plans should be based upon the particular needs in the State, and should be geared toward meeting those which are most pressing. They should be reasonably flexible, drawn with an eye toward future growth.

In general, there are four basic activities which State plans should include:

1. There should be an appraisal of the State's mental health needs and resources, on the basis of which immediate and long-range plans should be developed. Although the State should assume responsibility for initiating the appraisal, the United States Public Health Service stands ready to offer consultative service and assistance when desired.

2. Where needed, the staff in the central office should be enlarged to carry out the functions incumbent upon the State mental health authority. Most important of these functions are:

(a) The development, subsidy, or operation of psychiatric clinical services for adults and for children. (This will be discussed more fully later.)

(b) The licensure of mental hospitals.

(c) The development of State-wide records of the incidence of mental diseases and emotional disorders.

(d) The training of professional personnel—psychiatrists, psychologists, and psychiatric social workers—for staffing State and local mental health programs.

(e) The development of research in the field of mental diseases and emotional disorders.

(f) The education of other professional health workers, particularly public health nurses, in mental hygiene in order that they may contribute to mental health in the performance of their regular duties.

(g) The development of a well-rounded and practical program of mental health education of the public.

(h) Liaison or consultation with other agencies, such as education, welfare, penal, courts, civil service, etc.

3. As these operations are developed, new services in the central office can be established. For example, a section on training might be set up to stimulate and coordinate in-service and out-service training programs for nurses, attendants, staff physicians, and other mental health personnel.

In this connection, the importance of a program for the psychiatric education of general practitioners must be emphasized. In the past, too many physicians have felt that they knew little or nothing about mental diseases. This attitude, reflected in their practice, can be blamed to a great extent upon those responsible for the physicians' training. This situation has changed recently to some extent. The war has served to stimulate the interest of many physicians in the emotional aspects of illness. Many doctors who prior to the war were unacquainted with or resistant to psychiatric concepts were confronted in their combat experiences with undeniable evidence of the influence of emotional disturbance upon bodily function. As a result, many are now eager to learn more about psychosomatic medicine and methods of treatment which they as general practitioners might competently apply.

We must take advantage of this new and hopeful trend. Aside from the acute shortage of psychiatrists, the character and magnitude of the problem of mental illness makes it imperative that the general practitioner help meet it. In mental, as in other illnesses, he is the first line of defense. Properly trained and sensitized to the presence of psychiatric disturbances, he can deal effectively with the milder cases, thereby possibly staving off a disabling illness. Needless to say, he must also learn when *not* to treat a patient himself, and to refer to the specialist those patients suffering from severe emotional illnesses.

As part of your State plans, then, a program for the education of the general practitioner in mental health principles and practices should be seriously considered. Perhaps your State or county medical societies, your universities, medical schools, or hospitals could be stimulated to set up some type of educational program, such as institutes, seminars, conferences, or refresher courses for general practitioners, and preferably in their own communities when possible. This educational project could be accomplished either through the grant-in-aid funds allocated to the States from funds appropriated under the increased ceiling authorized for general health purposes, or under the provisions of the Mental Hygiene Division, which authorizes funds to be appropriated to promote training.

4. We turn now to what is perhaps the central core of the State's program—the establishment and expansion of community mental health clinics.

It has been estimated that in the entire country there are only about one-fifth the clinic services needed. Those which are available are for the most part concentrated in the larger population centers. Fifteen States are entirely without mental health clinics, and there are large areas in other States where no psychiatric facilities whatsoever are available.

The present goal of the Public Health Service in the grants-to-States program is the establishment by the States of at least one out-patient mental health clinic for each 100,000 of the population. Although this goal is not immediately attainable owing to the shortage of personnel, it may eventually prove to be quite conservative in terms of the need.

There is a time-proven formula for providing mental health services to the community. However, there is no reason why a State mental health authority need follow it; it may be that in a given State another approach would yield better results. Following is the standard pattern:

According to best present estimates, a full-time all-purpose mental health clinic should be provided for each 100,000 of the population.

It is preferable that this service be integrated with other health services in the community. The basic staff of the clinic should consist of one psychiatrist, one psychologist, two psychiatric social workers, and the necessary clerical assistance. One psychiatrically trained public health nurse may be substituted for one psychiatric social worker. The clinic should be available to all segments and all ages of the population.

The State mental health authority should take responsibility for furnishing sparsely settled and rural areas with centralized service in the form of traveling clinics, to provide mental health services otherwise not available to them. It is essential that there be a nucleus of local persons, perhaps in the school or health agency, which will carry out the recommendations made by the traveling team and establish some sense of continuity between visits. One member of the central clinic staff, perhaps the psychiatric social worker, should be permanently located in the branch office and the other members should come at regular and frequent intervals to provide a more complete service.

These clinics, whether mobile or stationary, should furnish three broad services: (1) A community clinic; (2) an auxiliary service to the mental hospital; and (3) an agency for community mental health education.

Such a clinic would serve the community by providing out-patient psychiatric treatment or psychological counselling for patients not in need of hospitalization and, most significant, for patients in the early stage of illness, when the prospect for cure is greatest. The accomplishment of this objective would require the active cooperation of other community agencies in carrying out, when indicated, plans for modification of the patient's environment.

It would serve the mental hospital by providing prehospitalization service and by referring those in need of institutional care to the hospital; by providing supervision and follow-up treatment of provisional-discharge or convalescent posthospitalization cases; and by supervising care-and-custody and boarded-out cases.

The mental health education function of the clinic would include dissemination of information about mental health principles and practices, active case-finding programs, and the study and control of mental disease from an epidemiological standpoint. The clinic cannot do the educational job alone. It needs to coordinate its educational activities with those of the school, the health department, and other community agencies.

The estimated cost of such a clinic would be approximately $40,000 to $45,000, depending upon whether it was stationary or mobile.

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Although the establishment of an all-purpose clinic for each community should be the goal, special problems frequently make themselves felt in a community before the need for an all-purpose clinic is appreciated. For example, there may be a pressing need for a child guidance clinic, for psychiatric services in the court, for an industrial psychiatric clinic. In such a case, it would be logical to initiate the mental health program by first establishing those services most urgently needed in the particular area. However, the program should not be allowed to stop there. It should be logically and progressively expanded to include the provision of mental health services for the whole community.

In developing your program, you should take advantage of whatever clinic facilities are available at present. These should be carefully scrutinized, expanded if feasible, and fully utilized. In some communities, a private nonprofit organization may furnish some degree of psychiatric service. If it were possible to give such an organization assistance through the State mental health authority, its facilities could perhaps be more widely utilized. It is important, therefore, that an appraisal of psychiatric resources be made at once in order to determine what facilities, either public or private, can be built upon and expanded.

After a clinic has established itself and demonstrated its worth through successful treatment of behavior problems in children, relieving psychoneurotic patients, and successfully supervising former hospital patients, it can expand into more truly preventive fields. These might include such programs as parent education, the promotion of special classes for exceptional children, marriage counselling, therapeutic recreational activities, and cooperative projects with courts and other agencies.

Such expansion, however, can succeed only if the clinic has full community support and approval. In this connection, close cooperation with other State and local lay and professional organizations in building up a good mental health program is so important that it cannot be too strongly emphasized. The State mental health authority will need the active cooperation of school administrators, welfare agencies, and professional and lay organizations, both in the preparation of plans and in carrying them out. It would be well, for example, for the State mental health authority to have an advisory board representing the various interested State agencies and organizations.

A State mental hygiene society can also be of great assistance in building up your program. Here is a grass-roots movement that can give much support. If such an organization already exists, the State mental health authority should call upon it to learn what the community attitudes are and what needs to be accomplished, and to

utilize its influence and efforts toward developing your program. If none exists, the State mental health authority should take an active part in establishing one. The National Committee for Mental Hygiene freely offers assistance in helping you organize a State mental hygiene society. It is hoped that chapters will eventually be set up in every State.

The establishment of a comprehensive mental health program need not wait until all or even most of the enigmas of nervous and mental disease are solved. Troubled people need help now, and we know enough to make our effort worth while. If community mental health services are set up, new techniques can be applied as they evolve. This has been the pattern in the development of programs for the prevention and control of venereal disease, tuberculosis, and other public health problems. The same principles can be applied successfully to mental disorders.

THE HOSPITAL SURVEY AND CONSTRUCTION ACT[1]

By V. M. Hoge, *Medical Director, Chief, Division of Hospital Facilities, United States Public Health Service*

The history of the Hospital Survey and Construction Act is of more than passing interest, since it illustrates the power of concerted action in a democratic nation. At the American Hospital Association conference in 1943, a resolution was passed in the house of delegates to the effect that the association should seek Federal aid in the construction of needed hospitals. One year and two months later, this resolution bore fruit with the introduction of Senate Bill 191 under the bipartisan sponsorship of Senator Lister Hill of Alabama and Senator (now Justice) Harold Burton of Ohio.

During the hearings, it soon became apparent that this was one bill the objectives of which everyone could agree upon. The bill had the immediate support of the American Hospital Association, the Catholic Hospital Association, and the Protestant Hospital Association. All major farm and labor organizations, organized medicine, dentistry and nursing, as well as numerous other groups and individuals of national importance, rallied to the support of this legislation.

The bill, as originally introduced, provided for a program of indefinite duration and, after the first year, set no ceiling on the funds that could be appropriated. It came out of the Senate committee with a limitation of 5 years on the duration and a limit of 75 million dollars per year on the funds that may be appropriated.

[1] Address before the Maryland-District of Columbia Hospital Association, Washington, November 25, 1946.

The Senate regarded the bill as one of great social significance and gave it profound study, passing it on December 11, 1945. It was then referred to the House of Representatives where further changes were made. The original bill called for a sliding scale of grants, in which the Federal contribution ranged from 33⅓ percent in the wealthiest State to 75 percent in the poorest State. As passed by the House, the Federal contribution was set at 33⅓ percent of the cost in all States. On August 13, 1946, the bill was signed by the President and became Public Law 725.

Let us now examine the contents of this act. It has four major parts, which broadly outline its purpose and objectives. Part A is a declaration of purpose; part B provides for the surveys and planning; part C provides for construction of hospitals; and part D sets forth the various administrative provisions. I should like to discuss briefly each of these parts.

Part A, or declaration of purpose.—This part states that it is the purpose of this act to assist the States to make an inventory of existing hospitals, survey the need for new hospitals, and develop a program for the construction of public and other nonprofit hospitals and health centers. The act makes it clear that hospitals to be built under this program are to augment existing hospitals and in no sense are to replace those now in satisfactory operation.

Part B, dealing with surveys and planning.—To assist the States in carrying out the surveys of need required by the act, 3 million dollars are authorized to be appropriated. One and one-half million dollars has been appropriated and is now available for allotment to the States. These allotments are made on a straight population basis, and no State is to be allotted less than $10,000. Funds from the Federal Government for this purpose must be met by non-Federal funds, at the rate of one-third Federal to two-thirds non-Federal funds. Application forms have been distributed and are now being received from the States requesting their allotments. These funds, unlike most Federal appropriations, do not revert to the Treasury if not used during the year, but remain available until expended.

In order to qualify for survey funds under this program, a State must do a number of things. First, it must designate a single State agency to carry out the survey. In a number of States this has already been done, either by action of the State legislature or by executive order of the Governor. Second, the State must appoint an advisory council to consult with the survey agency. This council is to be composed of widely representative individuals from non-governmental organizations and State agencies concerned with the construction, operation, and use of hospitals. It must include persons not concerned with the operation of hospitals but who are familiar

with the need for hospitals in urban and rural areas. A third condition for the approval of a survey grant is that the State must agree to carry out a survey of all hospital and public health facilities in the State and prepare a program for the construction of needed facilities.

It may be pointed out here that the comprehensive survey required in this act is unique in Federal health legislation. Federal grants for non-Federal hospitals are not new. They have been made under a number of different programs in past years; notably under the wartime Lanham Act, which also provided aid to voluntary as well as public hospitals.

In all these programs, the negotiations have been on a direct Federal-local level with the Federal agency determining the need in each instance as best it could. The distribution of hospitals and health centers, however, will not make sense unless the needs of each community are viewed in relation to neighboring communities and to the State as a whole. When these community needs have been analyzed throughout the State, a long-range plan for both construction and service can then be developed. The act requires that this be done before funds can be allotted to any construction project.

Fortunately for the progress of the program, many of the States have started comprehensive surveys under the guidance of the Commission on Hospital Care.

Part C, providing for the construction of hospitals.—In order to "assist the States" to construct the facilities found to be needed, Public Law 725 authorizes the appropriation of 75 million dollars annually for 5 years beginning with the fiscal year ending June 30, 1947. It should be made clear that the expression "to assist the States" does not refer to State-owned facilities only, but to all facilities within the State authorized by the act.

Although the survey funds are allotted on a straight population basis, the formula for allotting the construction money takes into account the difference in wealth among the States, as well as the population. This results in a per capita allotment of Federal funds starting at 24 cents in the wealthiest State. The reasoning behind this formula is that the gross deficit in hospital facilities becomes progressively greater in the States with less financial resources. The allocation of funds, however, remains the same in all projects in all States, i. e., one-third Federal and two-thirds non-Federal.

Part D, setting forth the administrative procedures.—It should be emphasized that the Hospital Survey and Construction Act is not another public works program. It is solely a grant-in-aid program in the interest of the national health. It delegates the major share of individual responsibility to the individual State. In making these provisions, Congress was apparently mindful of the fact that the con-

struction and operation of hospitals are essentially community responsibilities. In line with this philosophy, the law sets up specific limits within which the Surgeon General may prescribe regulations affecting the distribution and construction of all facilities authorized under the act. These regulations in turn must be approved by the Federal Hospital Council and the Federal Security Administrator.

As I have mentioned before, the Hospital Survey and Construction Act places unusual responsibilities on both the State governments and the public in general. Advisory councils are required at the State levels. A Federal Hospital Council with both advisory and administrative duties is required at the Federal level. This council, as required by law, is composed of eight members, with the Surgeon General serving as chairman ex officio. To quote the language of the act, "four of eight appointed members shall be persons who are outstanding in fields pertaining to hospital and health activities, three of whom shall be authorities in matters relating to the operating of hospitals, and the other four members shall be appointed to represent the consumers of hospital services and shall be persons familiar with the need of hospital services in urban or rural areas."

The Public Health Service has advisory councils to assist in all its major programs. The Federal Hospital Council, however, has more than advisory functions. It assists the Surgeon General in formulating the regulations for the administration of the act. Moreover, should a State plan be disapproved by the Surgeon General, the State may submit its plan to the council. If the council approves it, the Surgeon General must abide by this decision.

It will be recalled that there are two separate and distinct parts to this program. The first is the survey phase. This is under a State agency whose function is to conduct an inventory of existing facilities, to determine the need for new facilities, and to prepare an over-all program for the eventual meeting of these needs. This agency is, in a sense, a temporary agency whose function ends when the over-all program has been set up.

In the second or construction phase, a new agency comes into being. Although it is anticipated that in most instances this will be the same agency, this need not be the case. In any event, the new agency is permanent for the 5-year period specified in the act and has considerably heavier responsibilities than the agency set up for survey and planning. Whereas the law requires the first agency to prepare an over-all program, the second agency must prepare a State plan, of which construction is but a part. The State plan will include, among other things, the selection of projects in relative order of need.

After the State plan has been approved, an allotment may then be made to the State This will remain available for 2 years, during

which time approved projects may be charged against it. These funds are not turned over to the State agency at the time of allotment but are credited to the State and left in the Federal treasury. Payments on projects are made in installments as construction expense is incurred. These payments will be made to the State agency for transmission to the applicant or will be made directly to the applicant if for any reason the State is unable to handle the financial transaction.

In summary, the Hospital Survey and Construction Act makes the following provisions:

1. Authorizes 3 million dollars to pay one-third of the cost of State surveys and planning. One and one-half million dollars of this amount is now available.

2. Authorizes 75 million dollars per year for each of 5 years, beginning this year, to pay one-third of the cost of construction. Any portion of these funds not actually appropriated or used during any year may be added to the authorization of succeeding years. No construction funds have been appropriated as yet.

3. The States must designate a single State agency and advisory council for both the survey and planning phase and for the construction phase of the program.

4. After the State plan has been approved by the Surgeon General, allotments may be made to the State based on its authorized share of the funds.

5. After allotments have been made to a State, project applications may then be made to the State agency.

6. To be approved by the State agency, the project must have been included in the original over-all program. The State may, however, modify its original program from time to time.

7. To continue to receive allotments under this program after July 1, 1948, each State must have enacted what amounts to a hospital licensure statute.

In our enthusiasm over the enactment of the Hospital Survey and Construction Act, we should not overlook its limitations. Hospitals are expensive to build and require highly trained personnel for their operation. Consequently, it is in the wealthier States and metropolitan areas that our best facilities are concentrated. In the rural areas where the need is great, the mere provision of Federal funds to cover one-third of the construction cost will not solve the problem.

We must also face the fact that the funds authorized for 5 years cannot provide all the health facilities needed. Indeed, they will not meet all the urgent needs. Even if all the Federal funds are fully matched by non-Federal money, the total will take care of barely one-fourth the facilities required. How far rising costs will have

reduced this percentage, it is difficult to say, but we know it to be considerable.

Nevertheless, with this act hospitals have been brought into and made a part of the public health structure. The act reflects the current concept that public health includes responsibility for the treatment and care of the individual. It recognizes, also, that hospitals are an integral part of our social fabric, on a par in the community with the church and the school. This concept is not new, but its implications have seldom been fully realized in practice. Its application in the current program should have a profound influence on the future development of hospitals in this country.

LEGISLATION ON HOSPITAL SURVEYS, CONSTRUCTION, AND LICENSING ENACTED BY STATE LEGISLATURES IN 1945 AND 1946 (AS OF NOVEMBER 15, 1946)[1]

FOREWORD

The attached tables I, II, and III will bring up to date (as of November 15, 1946) the corresponding tables published as part of the paper on "Legislation on Hospital Surveys, Construction, and Licensing Considered by the State Legislatures in 1945" in the December 21, 1945, issue of PUBLIC HEALTH REPORTS (vol. 60, No. 51, pp. 1519–1539).

Since that paper was published, the Hill-Burton Bill, S. 191, which has had a strong influence on State hospital legislation, has become the Hospital Survey and Construction Act. This legislation, introduced in Congress on January 10, 1945, became law on August 13, 1946 (Public Law 725, 79th Cong.). This Federal enactment makes all the more important State legislation authorizing State-wide hospital survey and construction programs and hospital licensing, inasmuch as most States will need specific enabling legislation to participate in this new grant-in-aid program, and further because State legislation establishing minimum standards of maintenance and operation for the hospitals to be aided is a requirement of the Federal act.

Attention is called to the fact that table III is not intended to cover all hospital licensing laws, but only those enacted by the States in 1945 and 1946. Since hospital licensing is not in all States a new State function, 1945 and 1946 legislation does not include *all* hospital licensing laws. On the other hand, since State-wide hospital survey

[1] From the Division of Hospital Facilities, Bureau of State Services, U. S. Public Health Service.

and construction programs are new, tables I and II are intended to be exhaustive.

It has been found that from the beginning of the calendar year 1945 through November 15, 1946,

Thirteen States have enacted laws authorizing State-wide hospital surveys and planning:

Alaska	Indiana	South Carolina
Arizona	New Mexico	Vermont
California	Oklahoma	Virginia
Delaware	Rhode Island	Washington
Illinois		

Sixteen States have enacted laws authorizing State-wide hospital survey and/or construction programs:

Alabama	Missouri	Puerto Rico
Connecticut	New York	Texas
District of Columbia	North Carolina	Utah
Florida	Oklahoma	Virginia
Maine	Oregon	West Virginia
Mississippi		

These 16, however, include 2 States, Oklahoma and Virginia, which have separate hospital survey and planning laws; 1 State, Texas, whose law was ruled invalid by the State's Attorney General; and 1, Connecticut, whose law is limited to facilities for chronic disease patients.

With allowances made for these circumstances, it might be said that 25 States have enacted legislation still in effect which authorizes either State-wide hospital survey and planning programs or State-wide hospital construction programs of broad coverage, or both.

Fifteen States, during the above stated period, have enacted hospital licensing laws covering hospitals of one type or another:

Alabama	Indiana	Oklahoma
California	Maine	Pennsylvania
Delaware	Maryland	South Dakota
Georgia	Nebraska	Texas
Illinois	Nevada	Utah

Attention is called to the diversity among these State laws in the type of hospitals to be licensed thereunder.

The purpose of this study has been to bring together in summary form substantive legislation authorizing State-wide hospital survey and construction programs and hospital licensing. Appropriation acts, therefore, have not been included.

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TABLE I

Provisions of State legislation, enacted during 1945 and 1946, covering State-wide hospital surveys and planning (as of November 15, 1946)

Legislation	Agency administratively responsible for survey and planning	Advisory Council	Extent of administrative agency's authority	Remarks
Alaska ch. 11, Laws 1946 (S. 21).	Territorial Department of Health.	Council to be appointed by Governor, including representatives of the Alaska Development Board, Alaska Native Service, Veterans' Administration, Federal Works Agency, U. S. Public Health Service, Territorial Department of Health, "and an Alaskan resident from each Judicial Division, constituting the Board of Health."	Empowered to make a survey of all hospitals and health centers; compile conclusions as to additional hospital and health centers needed in conjunction with existing facilities, to serve adequately all the people of the Territory; to accept and expend Federal funds for survey and planning; and "acting on the advice of the Advisory Council," to approve the construction of hospital and health center facilities.	Similar to model hospital survey bill of Council of State Governments.
Arizona ch. 19, Laws 1945 (S. 2-X).	State Health Department.	A committee of 6 members, to be appointed by the Governor—1 representative of each of the following: Hospitals, medicine, nursing, agriculture, labor, business.	Substantially same as under Delaware ch. 88, Laws 1945.	Somewhat similar to the model hospital survey bill of the Council of State Governments.
California ch. 56, Laws 1946 (A. 88-X).	State Department of Public Health.	15 members to be appointed by Governor, representing nongovernment organizations or groups, State and local agencies, concerned with operation, construction or utilization of hospitals, including consumer and medical representation.	Required to survey, evaluate the sufficiency of existing hospitals and health centers, and compile conclusions as to additional facilities necessary, together with existing facilities, to serve all the people of the State. Authorized to accept and expend Federal funds for purposes of this act.	Shows influence of both the Federal Hospital Survey and Construction Act (S. 191) and the model State hospital survey bill of the Council of State Governments.
Delaware ch. 88, Laws 1945 (S. 195).	State Board of Health.	None.	Required to survey all hospitals and health centers in State and to compile conclusions as to additional hospital and health center facilities needed, in conjunction with existing facilities, to serve all the people of the State. Authorized to apply for and receive Federal funds for survey and planning purposes.	Similar to model hospital survey bill of the Council of State Governments.
Illinois S. 336, Laws 1945.	A new commission of 9 members set up under this act: 3 Senate members, 3 House members, and 3 to be appointed by Governor.	None.	Required to study hospitalization and medical-care needs of State and report to next Assembly.	State-wide hospital facility survey and planning program will probably be based, not on this law, but on an executive designation.

Illinois S. 436, Laws 1945.	A new Commission on the Care of Chronically Ill Persons—9 members: 3 Senate members, 3 House members, Director of Public Welfare, Director of Public Health, and Director of Illinois Public Aid Commission.	None.	Required to study adequacy of hospitalization and other treatment facilities for chronically ill and to report to next Assembly.	
Indiana ch. 101, Laws 1945 (S. 51).	State Board of Health.	None.	Same as under Delaware ch. 88, Laws 1945.	Similar to model hospital survey bill of the Council of State Governments.
New Mexico ch. 136, Laws 1945 (S. 263).	State Public Health Department.	12 members to be appointed by Governor and to include representatives of nongovernment groups, and of State agencies, concerned with the operation, construction, or utilization of hospitals.	Required to carry on all hospital surveys and planning programs and to report on same to Surgeon General, U. S. Public Health Service.	Similar to survey segment of Federal bill, S. 191.
Oklahoma ch. 1 c, Title 63, Session Laws 1945 (H. 476).	State Commissioner of Health.	6 members: Chairman, State Board of Public Affairs; Dean, Oklahoma School of Medicine, University of Oklahoma; and 1 named by each of the following 4 organizations: State Medical Association, State Osteopathic Association, State Hospital Association, State Nurses' Association.	Directed to survey need for hospital and health center facilities, develop programs for their construction; to carry out standards of the Surgeon General, U. S. Public Health Service, for developing such programs; and to make reports required by Surgeon General. Authorized to apply for and accept Federal funds for survey and program planning.	Similar in some respects to Federal bill, S. 191. Note that after a survey of all existing hospitals and health centers in State, their sufficiency to serve "all the *indigent* people of the State" is to be evaluated and additional facilities planned accordingly. Note, however, that Oklahoma ch. 1 e, Title 63, Session Laws 1945, the 1945 hospital construction bill (See Table II) provides *for* a State-wide hospital construction program to serve "all the people of the State".
Rhode Island ch. 1597, Laws 1945 (H. 718).	State Department of Health.	None.	Same as under Delaware ch. 88, Laws 1945.	Similar to model hospital survey bill of the Council of State Governments.
South Carolina Act 561, Acts 1946 (S. 124).	Research, Planning and Development Board.	11 members *consisting of* 3 from State Hospital Association, 3 from State Medical Association, 1 from State Dental Association, 1 from State Nurses' Association, the State Health Officer, and 2 citizens.	Required to survey all hospitals and health centers in State, compile conclusions as to additional hospital and health center facilities needed, in conjunction with existing facilities, to serve *all* the people of the State; to determine State aid necessary to supplement local funds to construct needed hospitals and health centers; to study all plans in State for hospital care of indigent; to establish minimum operating standards for hospitals receiving Federal aid under this act; to recommend to next Assembly, through Governor, on legislative action needed to effectuate an adequate State-wide hospital program; and to receive Federal funds. Authorized to accept services from State Board of Health, U. S. Public Health Service, other Federal agencies, and American Hospital Association and its affiliates.	Similar to, but goes further than, model hospital survey bill of Council of State Governments. Requires that general program covering standards of survey, evaluation of need, and statistics, to be gathered by Research, Planning and Development Board, first be approved by State Advisory Council. Also requires all applications for Federal aid to be first approved by Budget Commission.

Provisions of State legislation, enacted during 1945 and 1946, covering State-wide hospital surveys and planning (as of November 15, 1946)—Continued

Legislation	Agency administratively responsible for survey and planning	Advisory Council	Extent of administrative agency's authority	Remarks
Vermont ch. 5, Laws 1945 (H. 288).	A new commission of 5 members to be appointed by Governor under this act.	None	Substantially same as under Delaware ch. 88, Laws 1945.	Similar in some respects to model hospital survey bill of Council of State Governments.
Virginia ch. 5, Laws 1945 (S. 27).	State Department of Health	None	Same as under Delaware ch. 88, Laws 1945	Similar to model hospital survey bill of Council of State Governments.
Washington ch. 212, Laws 1945 (S. 233).	State Department of Health	A council of representatives of nongovernment groups, and of State agencies, concerned with the operation, construction, and use of hospitals—to be appointed by State Director of Health.	Substantially same as under Delaware ch. 88, Laws 1945.	Shows influence of both the model hospital survey bill of Council of State Governments and of the Federal bill, S. 191.

TABLE II

Provisions of State legislation, enacted during 1945 and 1946, covering State-wide hospital survey and/or construction programs (as of November 15, 1946)

Legislation	Agency administratively responsible for State program	Advisory Council	Extent of administrative agency's authority	Remarks
Alabama Act 211, Acts Regular Session 1945 (S. 107).	State Board of Health	Council of 13 members: 3 hospital administrators to be appointed by State Hospital Association, or by Governor, if the association fails to appoint; 1 member of State Board of Censors, to be appointed by that board; 4 members of the lay public, to be appointed by the Governor; State Health Officer; State Director of Public Welfare; Director of State Planning Board; Director of Finance; and Attorney General. State Health Officer to be chairman. (Note that the master hospital plan to be determined by the State Board of Health must be approved by the Advisory Council and that the latter is also required to "Approve the policies and regulations necessary for carrying out the purposes of this Act.")	Authorized to acquire, construct, maintain, and operate public hospitals, health centers, and related facilities; to administer Federal, State, and other funds for this purpose; to contract with any political subdivision or nonprofit association, for same purpose. Required to set up a master hospital plan, dividing State into regions, districts, and zones. Authorized to establish regulations providing standards for construction and operation of hospitals established under this act and providing for their annual licensing.	No specific provision is made for nonprofit voluntary hospitals to benefit from construction funds, either State or Federal. Although establishment of a master hospital plan for the State is required of the State agency, this act does not mention a survey of existing facilities; it does, on the other hand, provide for purely local determination of hospital needs (which seems to be contrary to a State-established master plan). Act 211 was dependent on the constitutional amendment proposed in Act 210, Acts of Regular Session 1945. This constitutional amendment, passed at the general election of November 5, 1946, empowers the State to acquire, own, and operate hospitals, health centers, and other health facilities, appropriate funds therefor, and to authorize political subdivisions to appropriate funds for such purposes.
Connecticut Public Act 437, Acts 1945 (Substitute for H. 144.)	A new Commission on the Care and Treatment of the Chronically Ill, Aged and Infirm, consisting of 5 electors appointed by Governor and, ex officio, the Commissioner of Health and Commissioner of Welfare.	None	Required to study problems of care and treatment of the chronically ill, aged, and infirm; to initiate a program, with the cooperation of State agencies concerned, to coordinate and develop existing resources for such care and treatment; to plan and, subject to approval of the General Assembly, construct or otherwise acquire, staff, and operate such buildings as necessary for care of such persons; to fix rates for care at such institutions and adopt regulations to carry out this act; to report and recommend biennially to Governor and General Assembly and draft legislation necessary to carry its recommendations into effect.	

Provisions of State legislation, enacted during 1945 and 1946, covering State-wide hospital survey and/or construction programs (as of November 15, 1946)—Continued

Legislation	Agency administratively responsible for State program	Advisory Council	Extent of administrative agency's authority	Remarks
District of Columbia Act 548, 79th Congress (S. 223).	Federal Works Administrator	None	Empowered to "make surveys and investigations, to plan, design, and construct hospital facilities in the District of Columbia"; to enter into leases with private agencies for operation and maintenance of such hospital facilities or usable separable portions thereof; to sell or convey in exchange for other properties any such hospital facilities or usable separable portion thereof to private agencies. In carrying out purposes of this act, required to provide a hospital center. (Hospitals participating in such center required to convey to the Government, clear of encumbrance, land and buildings now held by them or to sell same at prices approved by Federal Works Administrator and pay proceeds to the Government, at option of Federal Works Agency.)	
Florida ch. 22851, Acts 1945 (H. 724).	Authorizes the Governor to designate the agency. (See column 5.)	Authorizes the Governor to appoint a council "to conform with the terms of Federal legislation."	With specific reference to Federal legislation designed to assist States to survey the need for hospital facilities, which in conjunction with existing facilities, will be sufficient to serve all the people of the State, to develop construction programs, and to construct public and other nonprofit hospitals in accord with such programs, ch. 22851 authorizes the Governor to provide for carrying out such purposes in accordance with standards of the Surgeon General.	Shows influence of Federal bill, S. 191.—On Aug. 28, 1946, the Governor, acting under this law, designated the Florida Improvement Commission as the State agency administratively responsible for the program.
Maine Public Act 223, Laws 1945 (H. 844).	State Department of Health and Welfare.	None	Required to survey the need for additional hospital and health center facilities, which, together with existing facilities, will be sufficient to serve all the people of the State. Authorized to accept the provisions of any present or future Federal law making funds available for public health services of all kinds, including hospital and health center construction, and to meet requirements in connection with such funds.	Similar to, but goes further than, the model hospital survey bill of the Council of State Governments.

Mississippi ch. 363. Laws 1946 (H. 480),	The newly created Mississippi Commission on Hospital Care.	Council to be designated by the Commission on Hospital Care and to include representatives of nongovernment groups, State agencies, consumer interests concerned with operation, construction or utilization of hospitals.	Required to prepare and administer any State-wide plan for the construction, equipping and maintenance of hospitals and related facilities and to accept and administer Federal and other funds. Required to administer State grants-in-aid to public hospitals for construction and to contract with local hospitals so as to ensure that such hospitals will be constructed and operated in such manner that hospital services will be available to the people of the State at lowest possible cost. Authorized to inspect books of and to counsel with State-aided local hospitals to ensure sound accounting principles and efficient service. Authorized to establish an integrated State-wide nurse education program in connection with the State hospital system, to assist in promoting a voluntary prepayment plan of hospitalization insurance, and to receive and disburse funds from any source for promotion of a prepayment hospitalization plan.	While this law does reflect the influence of Federal bill, S. 191, it possesses an individual character and reflects an analysis of Mississippi's particular needs.
Missouri H. 459, Laws 1945	Division of Health of State Department of Public Health and Welfare.	7 members—to be appointed by Governor with advice and consent of Senate: 2 representatives of consumers of hospital service, 5 representatives of State and nongovernment organizations. Each of the 7 members must have at least 5 years of Missouri residence.	Authorized to survey all hospitals and health centers; to formulate a State plan for construction of additional facilities; to receive Federal and other grants for survey and construction and to pay them out under such provisions as attached to such grants; to render reports required under such grants; to provide and require compliance with such minimum standards of hospital maintenance and operation as necessitated by such grants.	Shows influence of Federal bill, S. 191.
New York ch. 666, Laws 1946 (A. 2789).	State Temporary Commission for Postwar Public Works Planning "or such other State agency as may be designated by the Governor." (See column 5.)	None	Required to carry out inventory and survey the need for construction of hospitals and health centers; to develop a program for construction of public and nonprofit hospitals and public health centers; and to construct such facilities. (Department of Taxation and Finance authorized to accept, as custodian, Federal funds for survey and planning and for making payments for construction of hospitals, public health centers, and related facilities)	Shows influence of Federal bill, S. 191. — On August 2, 1946, the Governor designated the Temporary Commission for Postwar Public Works Planning as the agency to administer the hospital survey and planning program.

Provisions of State legislation, enacted during 1945 and 1946, covering State-wide hospital survey and/or construction programs (as of November 15, 1946)—Continued

Legislation	Agency administratively responsible for State program	Advisory Council	Extent of administrative agency's authority	Remarks
North Carolina ch. 1096, Laws 1945 (H. 594).	The newly created N. C. Medical Care Commission of 20 members, of whom 18 appointed by Governor and 2 ex officio. Last 2 without vote. Of the 20, 3 representatives of the State Medical Society, 1 of the State Hospital Association, 1 of the State Dental Association, 1 of the State Nurses' Association, 1 of the State Pharmaceutical Association, 1 of Duke Foundation; 10 of agriculture, labor, industry, and other interests, and, ex officio, Commissioner of Public Welfare and Secretary, State Board of Health.	Five-member council, to be appointed by Governor and to include representatives of nongovernment groups, and of State agencies, concerned with the operation, construction, or utilization of hospitals and allied facilities.	Authorized to administer State fund aid for hospitalization of indigent; to survey needs for hospital and health center facilities and the need for State aid to furnish them, and to make recommendations and report on these needs to the next Assembly; to set up and administer any State-wide plan for construction and maintenance of hospitals and health centers; to administer loans to medical students; and to expand the Medical School of the University of North Carolina.	While this law shows the influence of Federal bill S. 191, it goes beyond it and provides for programs which supplement a hospital survey and construction program.
Oklahoma ch. 1e, title 63, Session Laws 1945 (H. 478).	State Commissioner of Health	Ch. 1e provides for no council, but refers to the State Advisory Council, presumably the one set up in Oklahoma ch. 1 c, title 63, Session Laws 1945. (See Table I.)	Directed to formulate and submit to the Surgeon General of the U. S. Public Health Service for approval, a State plan setting forth a hospital and health center construction program sufficient, in conjunction with existing facilities, to serve all the people of the State. Authorized to carry out approved State plan; to make reports required by the Surgeon General. Required to review the State plan from time to time and submit necessary modifications to Surgeon General and Federal Advisory Council. Authorized to accept Federal funds for construction and for administrative expenses and to comply with regulations relating to their expenditure.	Shows influence of Federal bill, S. 191.
Oregon ch. 285, Laws 1945 (H. 396).	State Board of Health	Council of 8 members, to be appointed by Governor and to represent nongovernmental groups and State agencies concerned with the operation, construction, or utilization of hospitals. Chairman of council: Secretary of State Board of Health.	Required to survey existing hospital and health center facilities in State and those necessary to serve all the people of the State; to formulate a State program providing for construction and maintenance and operation in order of relative need and when funds are available for such purposes; and to provide such methods of	Shows influence of Federal bill, S. 191.

			administering the State program as required by the Surgeon General. Authorized to process construction applications; to apply for and receive Federal funds for carrying out purposes of this act. With respect to any application for construction, authority of State Board of Health shall cease on completion of that construction.	
Puerto Rico Act 38, Acts 1946.	Insular Commissioner of Health	None	Authorized to expend $2,100,000 appropriation for preparation of plans and specifications, survey and acquisition of lands, construction and equipment of general district and municipal hospitals, tuberculosis, mental disease, chronic disease, and cancer treatment hospitals and medical centers; to accept Federal aid and fulfill requirements therefor. In the event Federal aid does not materialize within a reasonable time, Commissioner of Health required, with Governor's approval, to use the $2,100,000 appropriation for the construction of district hospital at Ponce.	A confused law. The administrative agency's authority as sole insular agency to develop a hospital construction program appears limited by the reference to the master plan for district hospitals adopted by the Planning Board and by the requirement that the Health Commissioner's priorities system for construction be approved by the Planning Board.
Texas H. C. R. 34, Laws 1945.	A new Hospital Survey Commission of 15 members, to be appointed by the Governor: 2 members from each of the 4 sections of the State, east, west, north, and south, with the remaining 7 from the State at large. Further, 6 members to be actively engaged in hospital work, 2 to be representatives of the press, 2 to be Senate members, 2 to be House members, 1 an architect, 1 an attorney, and 1 the President of the Texas County Judges Association. (See column 5.)	None	Authorized to survey existing hospitals and the need for additional hospitals and health centers, to recommend improvement of inadequate conditions, to execute the hospital program in conjunction with any and all Federal agencies, and to distribute Federal grants-in-aid in accordance with survey data and regulations.	A very confused bill. Although "said commission is hereby authorized and requested to make a comprehensive survey," it is also resolved in this measure "that the State Department of Public Health of Texas be designated as the agency to make necessary surveys." H. C. R. 34 was ruled invalid by the State's Attorney General within a month after its approval on June 6, 1945. On Sept. 18, 1945, the Governor designated the State Board of Health "to carry out the purposes" of Federal bill S. 191, with the aid of an advisory council named by the Governor at the same time.
Utah Public Act 58, Laws 1945 (S. 234).	State Department of Health	None	Authorized to receive Federal funds which may be made available for surveying, planning, constructing, and operating hospitals, public health centers, and related facilities, and for other health purposes.	This law is very brief, providing little other than what is given in the foregoing column.

Provisions of State legislation, enacted during 1945 and 1946, covering State-wide hospital survey and/or construction programs (as of November 15, 1946—Continued

Legislation	Agency administratively responsible for State program	Advisory Council	Extent of administrative agency's authority	Remarks
Virginia ch. 208, Laws 1946 (S. 258).	State Department of Health	None	Authorized to receive Federal funds for construction of public and other nonprofit hospitals and related facilities, such funds to be expended under regulations adopted by the State Department of Health.	Shows influence of Federal bill S. 191.
West Virginia ch. 100, Laws 1945 (H. 321).	State Department of Health	Authority conferred by this act on State Department of Health may be exercised only with joint approval of Commissioner of Health and the existing Public Health Council. (Also authorizes the Governor to appoint such advisory council as may be necessary under Federal law.)	Authorized to cooperate with the Federal Government in a hospital construction program; to inventory existing hospitals and public health centers, to adopt and supervise the administration of such a State-wide plan for the construction of additional hospitals and public health centers as may be necessary under Federal law making Federal aid available for such purposes.	Shows influence of Federal bill S. 191.

TABLE III

State legislation enacted in 1945 and 1946 providing for hospital licensing (as of November 15, 1946)

Alabama Act 211, Regular Session 1945 (S. 107).—Section 6 of this act authorizes the State Board of Health to license annually all hospitals "established under this act." (The act provides for the administration of Federal and other aid for public health centers and public and nonprofit general, tuberculosis, mental, chronic disease, and other types of hospitals.) The title of the act, however, authorizes the State Board of Health to license "all the hospitals in Alabama (except the Alabama State Hospitals, Partlow State School for Mental Deficients, tuberculosis hospitals, and hospitals operated by the Federal Government), whether private, nonprofit, or public."

California Ch. 1418, Laws 1945 (A. 601).—Requires licensing, by the State Department of Public Health, of all types of hospitals except Federal, State, county, and city hospitals; any hospital conducted by the regents of the University of California; hospitals conducted by or for religious groups depending on spiritual means for healing; and mental institutions under the jurisdiction of the State Department of Institutions.

Delaware Ch. 87, Laws 1945 (S. 94).—Requires a license from the State Board of Health of any sanatorium, rest home, nursing home, boarding home, and related institution for care of the "aged, infirm, chronically ill, or convalescent persons," operated by any person, partnership, association, or corporation.

Georgia Governor's Act 623, Laws 1945 (H. 732).—Authorizes the State Board of Health to license all hospitals, sanatoria, infirmaries, maternity homes, nursing homes, and other institutions for hospital or nursing care, except those operated by the Federal Government. Also authorizes the State Board of Health to deliver to any public hospital authority any funds made available by the Federal Government or by any other source, provided the State Board of Health expends all funds in accordance with any direction from the State or Federal Governments or the donor of the funds. Empowers the State Board of Health to prescribe the purposes for which any such funds may be used by any such hospital authority. This act is not to become effective until funds are made available to the State Board of Health for the purposes of this act by the Federal Government, State, any of the State's political subdivisions, or from any other source.

Illinois H. 252, Laws 1945.—Gives to the State Department of Public Health the function of licensing private nursing homes for physical illnesses. It specifically excludes institutions for mental illness and all hospitals.

Illinois H. 397, Laws 1945.—Requires a license from the State Department of Public Welfare for any private mental institution and any mental unit of a private general hospital.

Illinois S. 141, Laws 1945.—Requires a license from the State Department of Public Welfare for all private mental institutions and special mental departments in private general hospitals.

Indiana Ch. 346, Laws 1945 (H. 390).—The State Board of Health will license all hospitals, excluding mental institutions, through a newly created council, which will have important policy and administrative functions.

Indiana Ch. 335, Laws 1945 (S. 206).—Creates a new Indiana Council for Mental Health with various powers, including general supervision of public psychiatric institutions and the power to license private psychiatric institutions.

Maine Public Act 355, Laws 1945 (S. 405).—Requires a license by the State health agency for all public and private hospitals in the State, excluding State and Federal hospitals.

Maryland Ch. 210, Laws 1945 (S. 66).—The licensing powers given to the State Board of Health by this law apply to all hospitals in the State, except Federal hospitals.

Nebraska Public Act 169, Laws 1945 (H. 284).—Requires a license from the State health agency for any maternity hospital.

Nevada Public Act 73, Laws 1945 (A. 62).—Requires a license from the State health agency for any maternity hospital. This licensing requirement is apparently restricted to private hospitals.

Oklahoma Ch. 1b, Title 63, Sessions Laws 1945 (H. 468).—Gives to the State health agency the power to license all non-Federal hospitals in the State, except State mental hospitals.

Pennsylvania Act 68, Acts 1945 (S. 243).—Provides for licensing, by the State Department of Welfare, of mental hospitals operated by any person, copartnership, association, or corporation other than State hospitals.

South Dakota Public Act 108, Laws 1945 (S. 62).—Requires a license from the State Board of Health for every hospital and nursing home, except duly incorporated children's institutions. This measure was referred to the general electorate and adopted at the general election of November 5, 1946.

Texas Ch. 342, Laws 1945 (H. 127).—Requires a license from the State Department of Public Health for all private convalescent homes. This law defines a convalescent home as "any place or establishment where three or more pension or old age assistance recipients are housed for hire or profit," and specifically excludes hospitals.

Utah Public Act 54, Laws 1945 (S. 26).—Requires a license from the State health agency for any maternity hospital.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED DECEMBER 21, 1946

Summary

A total of 137 cases of poliomyelitis was reported for the current week, as compared with 197 last week, 90 for the corresponding week last year, and a 5-year (1941–45) median of 55. Last year's figure is the largest previously reported for a corresponding week since 1930. Only 9 States reported currently more than 4 cases, as follows (last week's figures in parentheses): *Increases*—Michigan 11 (6), Missouri 13 (4), North Carolina 6 (1), Oklahoma 9 (2); *decreases*—New York 11 (14), Ohio 5 (10), Illinois 7 (18), Texas 5 (14), California 19 (21). Since March 16, the approximate average date of lowest seasonal incidence, 24,626 cases have been reported, as compared with 13,251 and 18,933 for the corresponding periods, respectively, of 1945 and 1944, and a 5-year median for the period of 12,056. Of the current year's total for this period, 13,222 cases, or 54 percent, were reported in the North Central areas.

For the current week, a total of 3,338 cases of influenza was reported, as compared with 2,875 last week, 68,551 for the corresponding week last year, and a 5-year median of 2,717. States reporting currently more than 200 cases are as follows (last week's figures in parentheses): Texas 1,726 (1,365), Virginia 525 (255), South Carolina 500 (498). During the 21 weeks since the approximate average date of lowest seasonal incidence (July 28), a total of 30,315 cases has been reported, as compared with 309,301 for the same period last year and a 5-year median of 30,177.

Of 62 cases of tularemia reported for the week, 12 occurred in Illinois, 9 in Kansas, and 6 each in Virginia and Tennessee. To date a total of 1,114 cases has been reported, as compared with 789 for the corresponding period last year. The incidence this year has been above that for any prior year since 1941.

Deaths recorded during the week in 93 large cities of the United States totaled 9,378, as compared with 9,612 last week, 10,458 and 9,305, respectively, for the corresponding weeks of 1945 and 1944, and a 3-year (1943–45) average of 10,821. For the year to date, 460,804 deaths have been recorded for the same cities, as compared with 460,330 for the corresponding period last year.

Telegraphic morbidity reports from State health officers for the week ended Dec. 21, 1946, and comparison with corresponding week of 1945 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1941-45	Week ended—		Median 1941-45	Week ended—		Median 1941-45	Week ended—		Median 1941-45
	Dec. 21, 1946	Dec. 22, 1945		Dec. 21, 1946	Dec. 22, 1945		Dec. 21, 1946	Dec. 22, 1945		Dec. 21, 1946	Dec. 22, 1945	
NEW ENGLAND												
Maine	8	1	1	------	------	------	217	------	13	1	0	1
New Hampshire	0	1	0	------	------	------	1	2	2	1	0	0
Vermont	0	0	0	------	65	------	207	------	3	0	0	0
Massachusetts	25	5	5	------	------	------	125	124	167	0	2	4
Rhode Island	1	0	0	1	7	7	16	1	10	0	0	0
Connecticut	0	2	1	5	17	2	141	5	13	0	1	2
MIDDLE ATLANTIC												
New York	24	8	14	[1] 6	[1] 95	[1] 10	175	317	294	4	12	12
New Jersey	9	4	6	3	103	13	80	14	38	1	6	4
Pennsylvania	26	10	9	5	66	3	644	297	455	4	11	6
EAST NORTH CENTRAL												
Ohio	4	38	13	4	191	17	138	8	46	2	3	3
Indiana	7	11	7	5	717	20	5	16	16	1	4	4
Illinois	1	4	4	5	585	11	17	184	64	2	10	9
Michigan [2]	2	16	11	2	6	4	8	219	59	2	5	5
Wisconsin	0	4	3	31	1,293	31	58	31	142	3	3	3
WEST NORTH CENTRAL												
Minnesota	8	7	7	------	------	1	3	4	4	0	2	2
Iowa	3	9	2	------	270	1	7	3	33	0	8	0
Missouri	6	6	5	3	46	3	5	53	13	0	1	1
North Dakota	0	1	2	------	1,134	24	1	1	3	0	0	0
South Dakota	1	3	3	------	1	------	1	4	7	0	0	0
Nebraska	0	0	1	------	514	11	1	4	4	0	0	0
Kansas	14	5	8	1	7,715	15	3	56	25	0	0	1
SOUTH ATLANTIC												
Delaware	2	0	0	------	------	------	------	6	1	0	0	0
Maryland [2]	14	16	10	2	115	11	24	12	12	0	0	8
District of Columbia	1	1	0	1	6	3	17	2	2	0	0	1
Virginia	13	15	12	525	4,796	383	92	40	40	3	2	6
West Virginia	2	7	4	89	7,219	18	160	2	14	3	3	1
North Carolina	4	37	9	------	------	7	87	31	31	0	0	1
South Carolina	6	7	7	510	2,696	421	24	56	24	3	0	0
Georgia	14	8	8	15	298	71	14	3	13	0	0	2
Florida	1	6	7	------	12	9	34	6	6	1	0	1
EAST SOUTH CENTRAL												
Kentucky	12	4	3	4	6,816	18	52	120	12	5	2	2
Tennessee	10	20	11	25	394	56	4	3	13	2	7	4
Alabama	8	7	9	51	1,205	143	14	------	3	2	4	2
Mississippi [2]	12	14	8	------	------	------	------	------	------	1	1	1
WEST SOUTH CENTRAL												
Arkansas	4	18	11	58	2,021	97	10	10	35	0	2	0
Louisiana	2	9	10	4	44	11	6	3	5	1	1	1
Oklahoma	2	6	6	23	1,170	97	------	17	11	0	2	2
Texas	29	88	53	1,726	14,496	1,509	21	49	49	2	7	4
MOUNTAIN												
Montana	0	1	1	19	943	15	48	8	26	1	1	1
Idaho	1	1	1	19	1,144	2	4	30	4	0	1	0
Wyoming	3	0	0	------	------	15	------	15	12	0	1	0
Colorado	13	6	8	18	539	36	10	8	27	0	2	2
New Mexico	2	3	0	2	24	3	28	3	3	0	0	0
Arizona	1	9	0	163	1,608	164	77	9	8	0	0	0
Utah [2]	0	0	0	1	9,434	43	2	32	19	0	0	1
Nevada	0	0	0	------	------	------	------	31	------	0	0	0
PACIFIC												
Washington	1	3	3	------	54	4	25	148	40	1	3	3
Oregon	5	2	2	4	426	18	31	16	45	0	0	1
California	18	31	20	8	266	102	59	287	202	3	20	11
Total	319	454	361	3,338	68,551	2717	2,696	2,290	4.018	49	127	127
51 weeks	15,893	18,200	15,236	220,512	378,199	364,402	660,721	125,960	594,435	5,584	7,837	7,837
Seasonal low week [3]	(27th) July 5-11			(30th) Jul. 26-Aug. 1			(35th) Aug. 30-Sept. 5			(37th) Sept. 13-19		
Total since low	7,265	11,303	8,749	80,315	309,301	30,177	20,636	23,401	32,227	918	1,342	1,342

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Dates between which the approximate low week ends. The specific date will vary from year to year.

Telegraphic morbidity reports from State health officers for the week ended Dec. 21, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever [4]		
	Week ended—		Median 1941–45	Week ended—		Median 1941–45	Week ended—		Median 1941–45	Week ended—		Median 1941–45
	Dec. 21, 1946	Dec. 22, 1945		Dec. 21, 1946	Dec. 22, 1945		Dec. 21, 1946	Dec. 22, 1945		Dec. 21, 1946	Dec. 22, 1945	
NEW ENGLAND												
Maine	1	1	0	34	30	30	0	0	0	0	0	0
New Hampshire	1	0	0	4	0	8	0	0	0	0	0	0
Vermont	0	1	0	11	4	4	0	0	0	0	0	0
Massachusetts	1	3	3	124	111	238	0	0	0	2	2	1
Rhode Island	1	0	0	20	10	9	0	0	0	0	2	0
Connecticut	2	0	0	18	22	28	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York	11	11	7	249	233	279	0	0	0	3	3	3
New Jersey	0	0	0	79	81	79	0	0	0	2	1	0
Pennsylvania	2	0	1	101	137	163	0	0	0	8	2	2
EAST NORTH CENTRAL												
Ohio	5	0	1	232	205	243	0	1	1	1	0	1
Indiana	1	1	0	37	55	60	0	0	0	0	0	1
Illinois	7	3	2	121	110	130	0	1	1	1	2	2
Michigan [2]	11	2	0	137	185	155	0	0	0	2	1	1
Wisconsin	3	4	1	54	106	141	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	2	2	1	27	32	69	0	0	0	0	0	0
Iowa	4	5	0	33	42	46	1	1	0	0	0	0
Missouri	13	1	0	28	40	46	1	0	0	1	0	1
North Dakota	2	0	0	2	12	12	0	0	0	0	0	0
South Dakota	1	0	0	3	7	19	0	0	0	0	0	0
Nebraska	0	0	0	15	27	25	0	0	0	0	0	0
Kansas	4	2	0	25	56	60	0	0	0	0	0	0
SOUTH ATLANTIC												
Delaware	0	0	0	6	6	4	0	0	0	0	0	0
Maryland [2]	0	0	1	15	28	43	0	0	0	1	0	1
District of Columbia	1	1	0	4	12	16	0	0	0	2	0	0
Virginia	2	0	1	60	75	45	0	0	0	3	1	3
West Virginia	0	0	0	55	38	38	0	0	0	0	0	0
North Carolina	6	0	0	24	48	48	0	0	0	0	0	0
South Carolina	0	0	0	3	7	7	0	0	0	0	1	2
Georgia	1	4	0	17	15	23	0	0	0	0	2	1
Florida	0	3	0	1	5	6	0	0	0	0	5	3
EAST SOUTH CENTRAL												
Kentucky	1	0	0	50	30	32	0	0	0	1	0	2
Tennessee	0	0	0	27	29	49	0	0	0	2	2	1
Alabama	0	1	0	25	10	21	0	0	0	2	0	1
Mississippi [2]	4	4	0	5	30	22	0	0	0	0	0	1
WEST SOUTH CENTRAL												
Arkansas	3	0	1	5	17	8	0	0	0	1	1	1
Louisiana	3	0	1	9	12	8	0	0	0	0	0	1
Oklahoma	9	0	0	1	63	30	0	0	0	0	1	1
Texas	5	7	3	41	131	48	0	0	0	6	5	5
MOUNTAIN												
Montana	0	1	1	6	14	14	0	0	0	0	2	0
Idaho	1	0	0	6	0	7	0	0	0	4	0	0
Wyoming	0	0	0	6	1	4	0	0	0	0	0	0
Colorado	0	0	0	35	36	36	0	0	0	0	2	1
New Mexico	2	1	0	16	22	6	0	0	0	0	1	1
Arizona	0	1	1	8	16	5	0	0	0	4	0	0
Utah [2]	2	1	1	27	22	54	0	0	0	0	0	0
Nevada	1	0	0	1	0	1	0	0	0	0	0	0
PACIFIC												
Washington	3	4	1	27	12	44	0	0	0	0	0	1
Oregon	2	0	2	26	44	37	0	1	0	0	2	2
California	19	26	10	95	213	196	0	0	0	0	3	3
Total	137	90	55	1,956	2,397	2,712	2	4	8	41	41	47
51 weeks	25,092	13,648	12,358	111,108	170,178	137,454	332	343	730	3,966	4,814	5,418
Seasonal low week [3]	(11th) Mar. 15–21			(32nd) Aug. 9–15			(35th) Aug. 30–Sep. 5			(11th) Mar. 15–21		
Total since low	24,626	13,251	12,056	24,818	36,360	36,300	53	70	114	3,491	4,190	4,333

[2] Period ended earlier than Saturday.
[3] Dates between which the approximate low week ends. The specific date will vary from year to year.
[4] Including paratyphoid fever reported separately, as follows: Massachusetts 1 (salmonella infection); New York 2; Illinois 1; Michigan 1.

Telegraphic morbidity reports from State health officers for the week ended Dec. 21, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Whooping cough, Week ended— Dec. 21, 1946	Whooping cough, Week ended— Dec. 22, 1945	Whooping cough, Median 1941–45	Week ended Dec. 21, 1946: Dysentery, Amebic	Dysentery, Bacillary	Dysentery, Unspecified	Encephalitis, infectious	Rocky Mt. spotted fever	Tularemia	Typhus fever, endemic	Undulant fever
NEW ENGLAND											
Maine	18	44	39								
New Hampshire			2								
Vermont	25	19	19								1
Massachusetts	166	124	126		1						
Rhode Island	28	24	24								
Connecticut	36	41	39	1	1						2
MIDDLE ATLANTIC											
New York	236	169	202	13	9		2				1
New Jersey	144	106	106								1
Pennsylvania	177	90	93						1		3
EAST NORTH CENTRAL											
Ohio	83	52	92						4		4
Indiana	26	13	13						5		2
Illinois	105	38	54	8			2		12		10
Michigan [2]	201	119	119	1					2		1
Wisconsin	143	70	94	1					1		17
WEST NORTH CENTRAL											
Minnesota	9	23	23	1							1
Iowa	14	3	9								6
Missouri	18	9	9				1		4		8
North Dakota	1		7								
South Dakota		5	2								8
Nebraska	5	5	3								
Kansas	24	17	32				1		9		1
SOUTH ATLANTIC											
Delaware	4	1	1								
Maryland [2]	54	24	28					2	4		1
District of Columbia	4	6	7						1		
Virginia	84	46	46			10			6		4
West Virginia	10	8	18								
North Carolina	50	31	48								
South Carolina	27	86	41		2						
Georgia	10	6	6		1				1	8	4
Florida	2	3	5							2	1
EAST SOUTH CENTRAL											
Kentucky	52	6	19						1		
Tennessee	6	8	16			1	1		6		
Alabama	5	14	12							6	4
Mississippi [2]									2	4	5
WEST SOUTH CENTRAL											
Arkansas	15	1	12		2				1		
Louisiana	7		1	6						2	1
Oklahoma	17	1	3				1				1
Texas	170	147	128	5	390	82			1	11	7
MOUNTAIN											
Montana	5		9								
Idaho	1	17	12								
Wyoming	8		3								
Colorado	10	16	17	1							
New Mexico	10		8	3	1						
Arizona	55	9	9			11					
Utah [2]	1		8						1		1
Nevada	1	4									
PACIFIC											
Washington	23	27	23								
Oregon	6	8	9								3
California	65	90	90	4	9		1				5
Total	2,146	1,530	1,541	44	416	54	9	2	62	33	93
Same week, 1945	1,530			32	365	80	3	1	24	77	87
Average, 1943–45	1,464			39	397	92	6	[3] 1	27	[3] 77	
51 weeks: 1946	98,565			2,394	16,428	6,351	609	571	1,114	3,827	5,254
1945	122,344			1,917	24,484	10,421	616	467	789	5,128	4,770
Average, 1943–45	130,504		[3] 175,128	1,959	22,282	8,951	640	[3] 454	750	[3] 4,475	

[2] Period ended earlier than Saturday.
[3] 5-year median, 1941–45.
Leprosy: Michigan 2 cases; Louisiana 1 case; Colorado 1 case.

WEEKLY REPORTS FROM CITIES[1]

City reports for week ended Dec. 14, 1946

This table lists the reports from 86 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza: Cases	Influenza: Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
NEW ENGLAND												
Maine:												
Portland	0	0	1	0	19	0	1	0	8	0	0	------
New Hampshire:												
Concord	0	0	------	0	------	0	0	0	0	0	0	------
Vermont:												
Barre	0	0	------	0	------	0	0	0	0	0	0	------
Massachusetts:												
Boston	15	0	------	0	12	1	13	1	19	0	0	30
Fall River	0	0	------	0	------	1	2	0	2	0	0	6
Springfield	0	0	------	0	5	0	0	0	0	0	0	14
Worcester	1	0	------	0	------	0	7	0	2	0	0	28
Rhode Island:												
Providence	0	0	------	0	11	0	3	0	8	0	0	15
Connecticut:												
Bridgeport	0	0	------	0	1	0	1	0	1	0	0	1
Hartford	0	0	------	0	------	0	1	0	3	0	0	2
New Haven	0	0	------	0	13	0	0	0	3	0	0	7
MIDDLE ATLANTIC												
New York:												
Buffalo	3	0	------	0	------	0	5	0	11	0	0	8
New York	18	0	4	1	18	4	55	8	76	0	2	62
Rochester	0	0	------	0	8	0	3	0	10	0	0	3
Syracuse	1	0	------	0	------	0	2	0	7	0	0	31
New Jersey:												
Camden	1	0	------	0	------	0	1	0	1	0	0	2
Newark	0	0	4	0	8	0	1	0	14	0	0	19
Trenton	0	0	1	1	23	0	0	0	3	0	0	------
Pennsylvania:												
Philadelphia	6	0	7	1	18	0	23	0	30	0	0	52
Pittsburgh	2	0	------	0	316	0	9	0	15	0	0	16
Reading	0	0	------	0	2	0	2	0	4	0	0	13
EAST NORTH CENTRAL												
Ohio:												
Cleveland	1	0	8	0	87	0	6	3	26	0	0	22
Columbus	1	0	------	0	------	0	2	0	4	0	0	------
Indiana:												
Fort Wayne	1	0	------	0	3	0	3	0	3	0	0	1
Indianapolis	4	0	------	3	2	0	6	0	16	0	1	10
South Bend	0	0	------	0	------	0	0	0	3	0	0	------
Terre Haute	0	0	------	0	------	0	2	0	1	0	0	------
Illinois:												
Chicago	0	0	1	1	4	1	27	4	43	0	0	73
Springfield	0	0	------	0	------	0	2	0	2	0	0	4
Michigan:												
Detroit	4	0	------	0	3	1	2	1	35	0	0	75
Flint	0	0	------	0	------	0	3	1	5	0	0	3
Grand Rapids	0	0	------	0	------	0	1	0	7	0	0	9
Wisconsin:												
Kenosha	0	0	------	0	------	0	0	0	1	0	0	3
Milwaukee	0	0	------	0	7	0	3	1	13	0	0	112
Racine	0	0	------	0	------	0	0	0	5	0	0	5
Superior	0	0	------	0	------	0	0	0	0	0	0	------
WEST NORTH CENTRAL												
Minnesota:												
Duluth	1	0	------	0	------	0	0	0	0	0	0	3
Minneapolis	3	0	------	0	2	3	0	0	13	0	0	13
St. Paul	0	0	------	0	------	1	7	0	5	0	0	------
Missouri:												
Kansas City	0	0	------	1	------	0	4	1	3	0	0	1
St. Joseph	0	0	------	0	------	0	0	0	0	0	0	1
St. Louis	7	0	------	0	------	0	8	4	14	0	0	6

[1] In some instances the figures include nonresident cases.

City reports for week ended Dec. 14, 1946—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
Nebraska:												
Omaha	0	0	------	0	------	0	5	1	3	0	0	2
Kansas:												
Topeka	1	0	------	0	------	0	0	0	1	0	0	1
Wichita	0	0	------	0	2	0	2	0	2	0	0	3
SOUTH ATLANTIC												
Delaware:												
Wilmington	1	0	------	0	1	0	0	0	1	0	0	1
Maryland:												
Baltimore	4	0	------	0	7	0	6	1	11	0	1	57
Cumberland	0	0	------	0	2	0	0	0	0	0	0	------
Frederick	0	0	------	0	------	0	0	0	0	0	0	------
District of Columbia:												
Washington	0	0	------	0	14	0	8	0	10	0	0	12
Virginia:												
Lynchburg	0	0	------	0	1	0	0	0	1	0	0	2
Richmond	0	0	------	2	3	1	1	0	7	0	0	3
Roanoke	1	0	------	0	2	0	0	0	2	0	0	------
West Virginia:												
Wheeling	0	0	------	0	1	0	2	0	2	0	0	5
North Carolina:												
Raleigh	0	0	------	0	------	0	0	0	0	0	0	1
Wilmington	0	0	------	0	1	0	0	0	1	0	0	------
Winston-Salem	0	0	------	0	41	0	1	0	1	0	0	2
South Carolina:												
Charleston	0	0	11	1	3	0	1	0	1	0	0	------
Georgia:												
Atlanta	0	0	2	1	3	0	0	0	2	0	0	4
Brunswick	0	0	------	0	------	0	1	0	0	0	0	1
Savannah	0	0	1	0	4	0	0	0	0	0	0	------
Florida:												
Tampa	3	0	------	0	------	0	5	0	1	0	0	1
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	1	0	------	1	------	0	12	0	8	0	0	9
Nashville	0	0	------	1	------	0	3	0	2	0	0	3
Alabama:												
Birmingham	0	0	------	0	1	0	3	0	2	0	0	------
Mobile	2	0	8	2	------	0	0	0	0	0	0	3
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	------	0	1	0	0	2	0	0	0	------
Louisiana:												
New Orleans	0	0	------	0	------	1	8	0	2	0	0	1
Shreveport	0	0	------	0	------	0	3	0	0	0	0	------
Texas:												
Dallas	1	0	------	0	4	0	3	0	2	0	0	1
Galveston	0	0	------	0	------	0	1	0	0	0	0	------
Houston	0	0	------	0	------	0	5	2	1	0	0	1
San Antonio	2	0	1	1	------	0	4	0	1	0	0	------
MOUNTAIN												
Montana:												
Great Falls	0	0	------	0	5	0	0	0	1	0	1	------
Helena	0	0	------	0	1	0	0	0	0	0	0	------
Missoula	0	0	------	0	------	0	0	0	0	0	0	------
Idaho:												
Boise	0	0	------	0	------	0	0	0	0	0	0	------
Colorado:												
Denver	4	0	6	0	1	1	0	0	18	0	0	15
Pueblo	4	0	------	0	------	0	0	0	3	0	0	------
Utah:												
Salt Lake City	1	0	------	0	3	0	0	0	8	0	0	

City reports for week ended Dec. 14, 1946—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle	0	0	------	0	------	0	2	3	2	0	0	8
Spokane	0	0	------	0	5	0	0	0	4	0	0	------
Tacoma	0	0	------	0	2	0	0	1	1	0	0	1
California:												
Los Angeles	1	0	3	3	8	3	3	3	15	0	1	7
Sacramento	0	0	------	0	------	0	0	0	1	0	0	------
San Francisco	1	0	4	0	3	2	2	3	11	0	1	3
Total	96	0	57	20	681	20	286	40	542	0	7	797
Corresponding week, 1945	89	------	1,442	64	786	------	432	------	706	0	3	543
Average, 1941–45	81	------	1,208	[2] 107	[3] 831	------	[2] 596	------	851	0	12	690

[2] 3-year average, 1943–45.
[3] 5-year median, 1941–45.

Dysentery, amebic.—Cases: Chicago 1; Detroit 1; Los Angeles 2.
Dysentery, bacillary.—Cases: New York 2; Philadelphia 1; Los Angeles 2.
Dysentery, unspecified.—Cases: San Antonio 6.
Rocky Mountain spotted fever.—Case: St. Louis 1.
Tularemia.—Cases: Boston 1; Indianapolis 2; St. Louis 3; Memphis 1.
Typhus fever, endemic.—Cases: Tampa 1; Birmingham 1; Mobile 2.

Rates (annual basis) per 100,000 population, by geographic groups, for the 86 cities in the preceding table (estimated population, 1943, 33,799,900)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England	41.8	0.0	2.6	0.0	159	5.2	73.2	2.6	120	0.0	0.0	269
Middle Atlantic	14.3	0.0	7.4	1.4	182	1.9	46.7	3.7	79	0.0	0.9	95
East North Central	7.1	0.0	5.8	2.0	68	1.8	30.7	6.4	105	0.0	0.6	204
West North Central	24.1	0.0	0.0	2.0	8	8.0	52.3	12.1	82	0.0	0.0	60
South Atlantic	15.1	0.0	23.4	6.7	139	1.7	41.0	1.7	67	0.0	1.7	149
East South Central	17.7	0.0	17.7	23.6	6	0.0	106.2	0.0	71	0.0	0.0	89
West South Central	8.6	0.0	2.9	2.9	14	2.9	68.9	11.5	17	0.0	0.0	9
Mountain	73.9	0.0	49.2	0.0	82	8.2	0.0	0.0	230	0.0	8.2	123
Pacific	3.2	0.0	11.1	4.7	28	7.9	11.1	15.8	64	0.0	3.2	30
Total	14.9	0.0	8.8	3.1	105	3.1	44.2	6.2	84	0.0	1.1	123

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended November 30, 1946.—During the week ended November 30, 1946, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		40	2	168	355	61	19	97	202	944
Diphtheria		5	2	55	28	4	1	1	3	99
Dysentery:										
Amebic					5					5
Bacillary				1						1
German measles				6	14			8	5	33
Influenza		11			1	3			15	30
Measles		173	1	66	130	31	549	159	178	1,287
Meningitis, meningococcus			1	1	1		1		1	5
Mumps		3		100	375	44	112	34	123	791
Poliomyelitis	3	2		4	1		1			11
Scarlet fever		9	8	81	113	10		3	9	233
Tuberculosis (all forms)		7	6	126	53	36	7		49	284
Typhoid and paratyphoid fever				5					11	16
Undulant fever				2		1		5	1	9
Venereal diseases:										
Gonorrhea		23	9	206	112	44	34	54	74	556
Syphilis		8	2	89	106	14	5	12	52	288
Other forms									2	2
Whooping cough		13	1	35	147	36	15	1	10	258

CUBA

Habana—Communicable diseases—4 weeks ended December 7, 1946.—During the 4 weeks ended December 7, 1946, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Chickenpox	3		Poliomyelitis	2	
Diphtheria	19		Tuberculosis	9	1
Malaria	10		Typhoid fever	23	
Measles	13				

Provinces—Notifiable diseases—4 weeks ended November 30, 1946.—During the 4 weeks ended November 30, 1946, cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana[1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer	4	10	8	21	1	16	60
Chickenpox		4		1			5
Diphtheria	1	20	1		2	1	25
Dysentery, amebic		1					1
Hookworm disease		23					23
Leprosy		3					3
Malaria	17	8		5	2	53	85
Measles		14					14
Poliomyelitis	3	3	1		2	1	10
Scarlet fever	1						1
Tuberculosis	5	21	11	46	19	68	170
Typhoid fever	18	44	3	19	7	42	133
Whooping cough						2	2

[1] Includes the city of Habana.

ICELAND

Poliomyelitis.—Information dated December 3, 1946, stated that an outbreak of poliomyelitis had occurred in Rejkjavik, Iceland, and other parts of the country.

NORWAY

Notifiable diseases—September 1946.—During the month of September 1946, cases of certain notifiable diseases were reported in Norway as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	15	Mumps	161
Diphtheria	305	Paratyphoid fever	16
Dysentery	5	Pneumonia (all forms)	949
Encephalitis, epidemic	5	Poliomyelitis	221
Erysipelas	555	Rheumatic fever	138
Gastroenteritis	4,218	Scabies	5,111
Gonorrhea	1,068	Scarlet fever	521
Hepatitis, epidemic	492	Syphilis	148
Impetigo contagiosa	5,038	Tuberculosis (all forms)	339
Influenza	1,564	Typhoid fever	4
Lymphogranuloma inguinale	3	Weil's disease	1
Malaria	2	Whooping cough	3,591
Measles	162		

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Plague

Portugal—Azores—Matriz.—For the period November 24 to December 7, 1946, 4 cases of bubonic plague with 3 deaths were reported in Matriz, Azores, Portugal.

Smallpox

China—Hong Kong.—For the week ended December 7, 1946, 188 cases of smallpox were reported in Hong Kong, China.

Liberia—Monrovia.—For the period September 24 to November 8, 1946, 150 cases of smallpox with 8 deaths were reported in Monrovia, Liberia.

Libya.—From the beginning of the outbreak in September 1946, up to November 22, 1946, 556 cases of smallpox with 86 deaths have been reported in Libya. For the week ended November 29, 1946, 50 cases of smallpox were reported.

Malay States (Federated)—Trengganu.—Smallpox has been reported in Trengganu, Federated Malay States as follows: Weeks ended—December 7, 1946, 232 cases, 29 deaths; December 14, 1946, 129 cases, 39 deaths.

Typhus Fever

Guatemala.—For the month of October 1946, 78 cases of typhus fever with 6 deaths were reported in Guatemala. Departments reporting the highest incidence are: Quezaltenango, 59 cases, 2 deaths; Sacatepequez, 8 cases, 1 death.

DEATHS DURING WEEK ENDED DEC. 14, 1946

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Dec. 14, 1946	Corresponding week, 1945
Data for 92 large cities of the United States:		
Total deaths	9, 590	10, 201
Average for 3 prior years	10, 870	
Total deaths, first 50 weeks of year	450, 254	448, 693
Deaths under 1 year of age	803	630
Average for 3 prior years	640	
Deaths under 1 year of age, first 50 weeks of year	33, 309	30, 806
Data from industrial insurance companies:		
Policies in force	67, 314, 498	67, 250, 961
Number of death claims	12, 089	12, 389
Death claims per 1,000 policies in force, annual rate	9. 4	9. 6
Death claims per 1,000 policies, first 50 weeks of year, annual rate	9. 4	10. 0

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FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

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It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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INCIDENCE OF DISEASE

Public Health Reports

Vol. 62 • JANUARY 17, 1947 • *No. 3*

Printed With the Approval of the Bureau of the Budget as Required by Rule 42 of the Joint Committee on Printing

THE CONTROL OF RAT ECTOPARASITES WITH DDT[1]

By RUSSELL G. LUDWIG, *Senior Assistant Sanitary Engineer (R)*, and H. PAGE NICHOLSON, *Senior Assistant Sanitarian (R), United States Public Health Service*

Field studies were initiated in the early part of May 1945 to determine the effect of DDT on the various rat ectoparasites as a possible means of controlling endemic typhus fever and to develop equipment for the application of DDT. Detailed data have been collected from 11 treated establishments in the business districts of Savannah, Ga., which include 3 retail grocery stores, 2 wholesale grocery stores, 1 wholesale grocery warehouse, 2 poultry stores, 1 cafe, 1 feed store, and 1 chicken hatchery. These establishments were chosen from a considerable number of premises inspected for rat and rat ectoparasite infestations and, in general, represent premises with heavy infestations. Data also have been collected from many untreated establishments of similar types in order to evaluate the control data by establishing normal population variation throughout the study period. It should be noted that almost all of the rats trapped in these field studies were of the species *Rattus norvegicus*. Of 562 rats examined, only 6 of the species *Rattus rattus* were encountered.

FIELD METHODS

Trapping.—At each of the above-mentioned premises, traps were set before treatment, approximately 1 week following treatment and once each month thereafter. Occasionally, it was necessary to allow a time interval longer than one month between trappings because of limitations in the rat populations in certain premises.

All of the rats examined for ectoparasites in these studies were trapped in unbaited No. 0 steel traps. An adequate live sample of a rat population can be secured readily with proper use of this type of

[1] From Communicable Disease Center, Technical Development Division (Savannah, Ga.), States Relations Division.

trap. Traps were set along well-defined rat runways and at the mouths of holes and burrows after a careful inspection to locate all infestations in each establishment. The traps were scattered over the infested areas in order to randomize the samples.

The number of rats trapped from each premise before and after treatment was dependent upon the rat population present. Five to seven rats were considered to be a satisfactory sample in most premises at each trapping period. A larger sample would have been desirable from a statistical standpoint, but since it was necessary to have a rat population available throughout the study period, the samples were limited so as not to deplete the supply.

After treatment with 10-percent DDT dust, traps were set in such positions as to prevent trapped rats from contacting DDT dust after having been caught. Trap chains were nailed close to the traps themselves to limit the effective radius of the rats' movements.

Collection of ectoparasites and identification.—Rats caught alive were transferred to flea-proof rat bags (seams turned out), tagged, and taken to the laboratory. Rats and ectoparasites were killed in the secured bags by exposure to chloroform. Ectoparasites were then removed from the rats by a combination of combing and beating, allowing the ectoparasites to drop into a large, shallow, white-enameled pan from which they were readily collected. The inside of each bag was examined carefully for any parasites which may have left the host rat.

A total of five species of fleas were taken throughout the course of this study. *Xenopsylla cheopis* (Rothschild), the oriental rat flea, was by far the most predominant of these species. Other species of fleas collected were: *Nosopsyllus fasciatus* (Bosc), *Leptopsylla segnis* (Schönherr), *Echidnophaga gallinacea* (Westwood), and *Ctenocephalides felis* (Bouché).

Species of mites collected were: *Liponyssus bacoti* (Hirst), *Laelaps hawaiiensis* (Ewing), *Echinolaelaps echidninus* (Berlese), and an unidentified species of the genus *Uropoda*. One species of louse, *Polyplax spinulosa* (Berm.), was taken.

Treatment.—In treating any premise with DDT, it is desirable to apply the dust in such a manner as to insure its contact with the rat ectoparasites. Whenever possible, the DDT dust should be applied directly to the ectoparasite breeding places which are usually associated with rat nests and harborages. Rat fleas, which spend part of their time off their host, are found abundantly in these places. Any place suspected of containing a rat nest or providing harborage, therefore, must be given a thorough dusting. Indirect means of contact, however, will have to be relied upon partly, and in some cases wholly. Dust applied along active rat runways will be picked up

on the feet and tails of the rats as they move along the runways, and thereby will be carried back to the nest and harborage areas. Rats also will pick up dust over their entire bodies when passing through dusted holes and burrows, which frequently are no longer than is necessary to allow passage of the rat. In addition, rats habitually preen themselves, and dust accumulated on their feet will be transferred to the fur in this manner. Fleas on the rats then will contact the DDT dust while moving through the fur.

The quantity of dust necessary for any single treatment will vary within wide limits, due to the large variation in the size and character of the places to be treated. In general, the quantity of dust will be proportional to the amount of rat infestation. The 11 test establishments used in this study were treated with an average of 8 pounds of 10-percent DDT dust.

The method of treatment of the test establishments used in this study was as follows. A dust composed of 10-percent DDT in pyrophyllite was applied to rat runways, rat burrows and rat harborages at the average rate of 8 pounds per premise. Particular effort was made to treat burrows and harborage areas thoroughly. On completion of dusting into burrows and holes with the cyanogas foot pump [2] described below, a small amount of dust was placed directly in the mouth of the hole, and if the hole was in a horizontal plane, a ring of dust was laid around it (fig. 3). This procedure was used to insure maximum contact by the rats on entrance. That maximum contact occurred was borne out by the fact that dust so applied usually had been wiped up to a large degree by the passage of rats after several days had elapsed.

Occasionally, it was necessary to remove materials which might become contaminated with DDT, or to move merchandise, rubbish, or other materials to gain access to the more important rat infestations. Such a procedure is recommended, for it has been found that a complete treatment of the rat-infested premise is necessary for the over-all control of rat fleas. In one establishment, a single runway was omitted from dusting operations because of sacked grain tightly stacked throughout its length. Although the rat fleas were almost eliminated from all other parts of the premise, rats trapped along this runway after treatment continued to show considerable numbers of fleas. In another premise, fleas were not eliminated from a single feed room (of a 12-room premise) omitted from treatment.

Equipment.—Many different pieces of dusting equipment were tested for practicability in the DDT dusting work. Two types of equipment were selected on the basis of actual field performance.

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[2] The cyanogas foot-pump duster is a product of American Cyanamid & Chemical Corp., New York, N. Y.

(1) Cyanogas foot-pump duster: This duster can be obtained with a 5-pound-capacity cylinder (fig. 1A) which is quite suitable for the work. The 1-pound-capacity jar-type duster (fig. 1B) works just as well but needs frequent refilling. This type of duster was used to blow 10-percent DDT dust into the burrows, holes leading into double floors and walls, and any other enclosed places suspected of being possible nesting or harboring places for rats (fig. 2). Treatment of these nests and harborages with the cyanogas foot duster was the primary aim of each control study reported herein. It is felt that the greater part of both initial and lasting control of *X. cheopis* was achieved through use of this duster.

(2) Hand-shaker dusters: These dusters were designed to accomplish a definite purpose: i. e., to apply a light layer of dust along a rat runway quickly and without billowing. The large type (figs. 4A and 5A) was used to dust runways in which there were no obstructions and in which there was freedom of movement, as shown in figure 6. The smaller hand duster with extension handle (figs. 4B and 5B) was used to dust out-of-the-way rat runs and such places to which access was

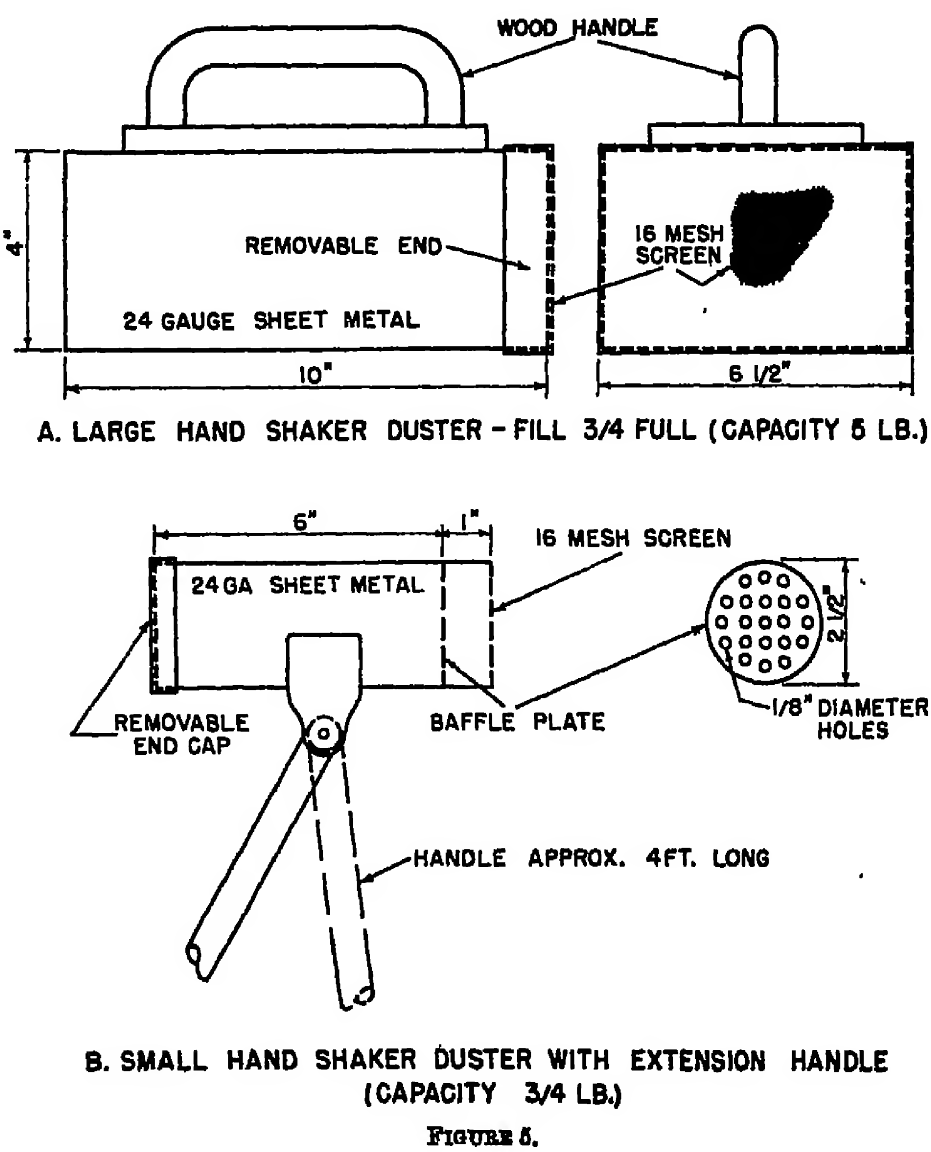

FIGURE 5.

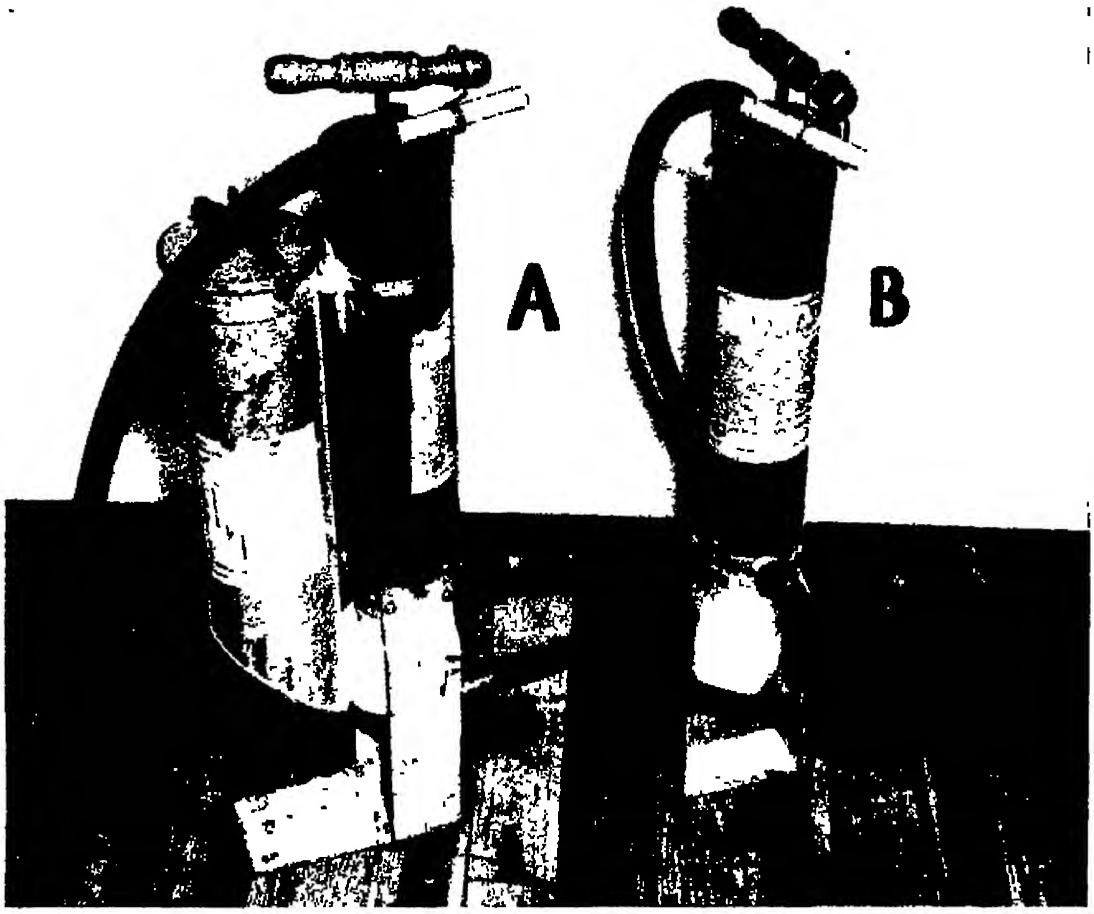

FIGURE 1.—Cyanogas foot-pump dusters used to treat enclosed harborages.

FIGURE 2.—Operating the cyanogas foot-pump duster on a typical rat burrow.

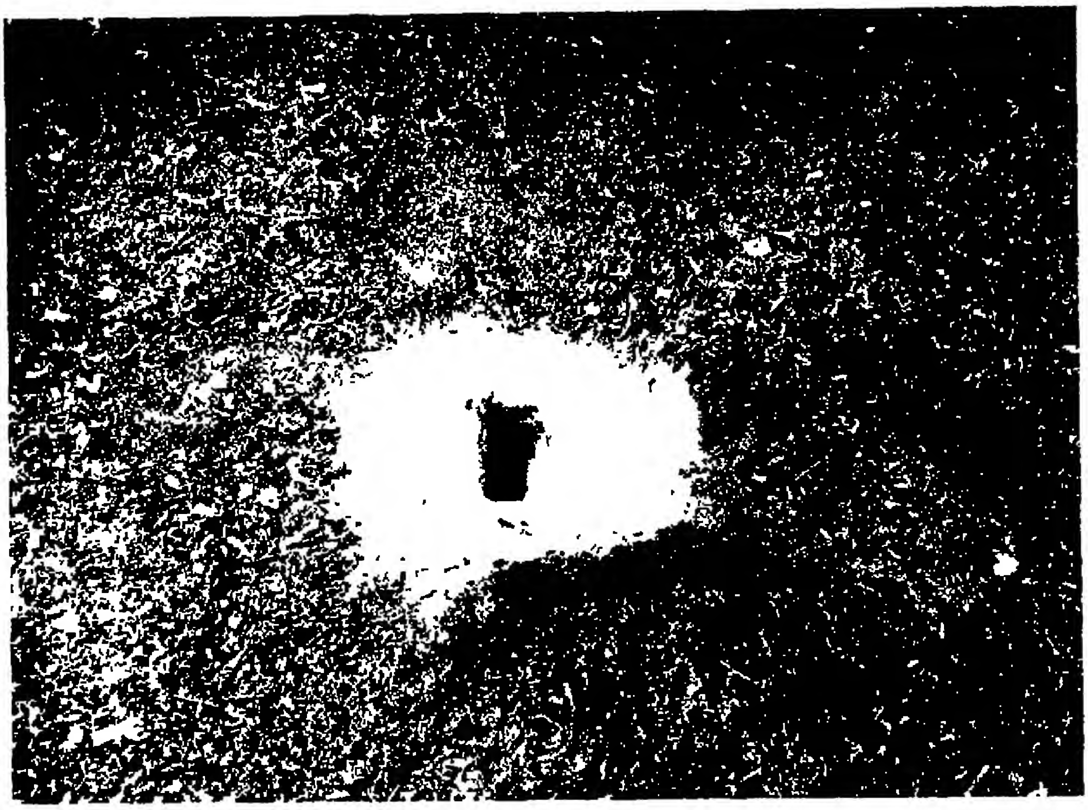

FIGURE 3.—Typical rat burrow showing ring of DDT dust applied after treating with cyanogas foot-pump duster.

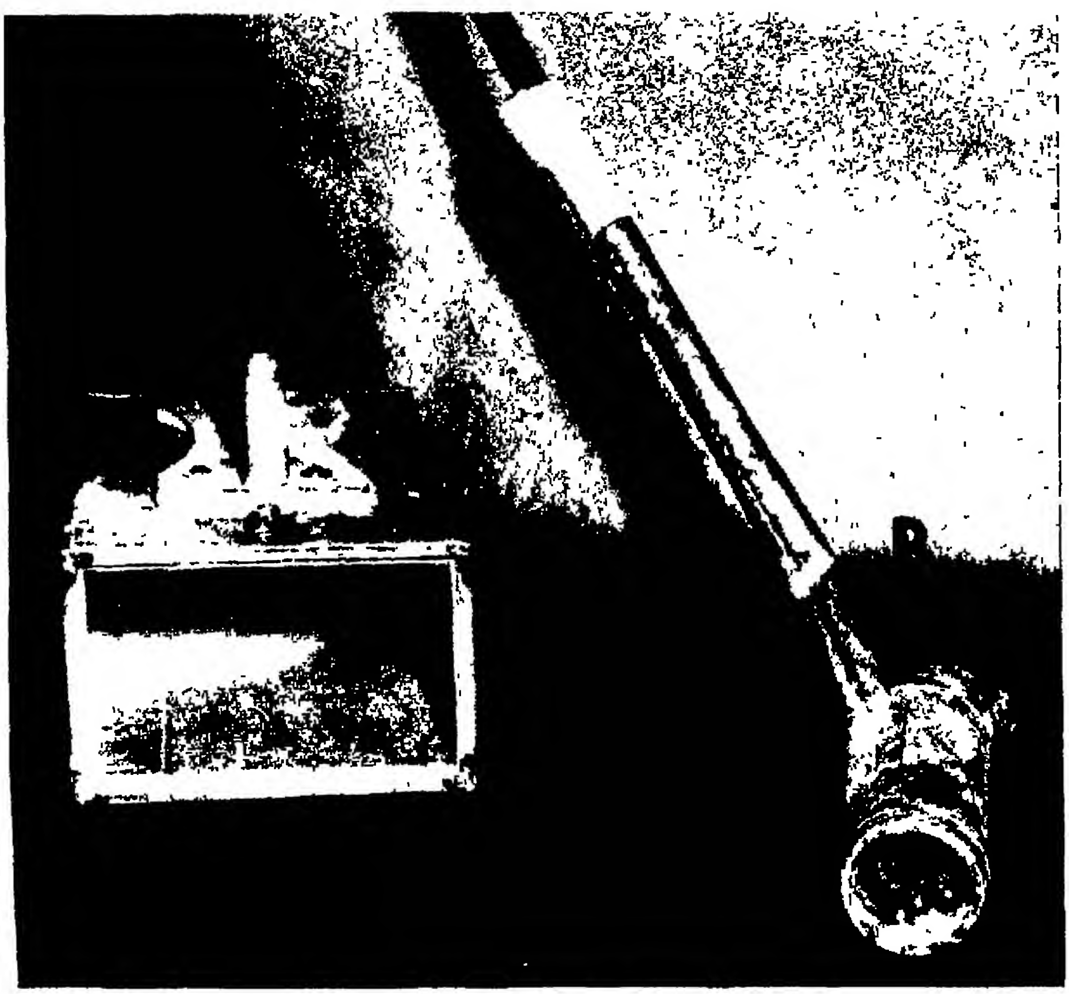

FIGURE 4.—Hand-shaker dusters designed to treat rat runways.

difficult, as shown in figure 7. This duster was also very useful to dust overhead runs, and along beams and wall plates. These hand-shaker dusters also were used to apply a generous layer of dust at the mouths of burrows and at the openings into enclosed places which already had been treated with the cyanogas foot duster.

Precautions.—DDT is a poisonous substance and, although there have been very few recorded cases of human poisoning, the material should be used with some degree of caution. Dusting operators should be especially careful to prevent contamination of foodstuffs. The hand-shaker duster was designed to meet this requirement, since blower-type dusters tend to billow the dust, and controlled application becomes very difficult. Grain sweepings from treated establishments should not be used for food purposes, and the managements should be so informed. The dusting operator also should be protected when exposed to DDT dusts for considerable periods of time. An ordinary dust respirator affords satisfactory protection.

RESULTS

The evaluation of the studies in the 11 establishments treated with 10-percent DDT dust is based primarily on the control of the oriental rat flea, *X. cheopis* (Rothschild). The original objective was to determine the extent and period of control of all of the more important ectoparasite species found on rats, especially those thought to be possible vectors of endemic typhus fever. Of the 10 species of ectoparasites found on rats in Savannah, Ga., only *X. cheopis* was found in sufficient numbers and with a uniformity of distribution throughout the study period (May 1 to November 1, 1945) to permit an analysis of seasonal population variations. (See footnote to table 1.)

The normal populations of *X. cheopis* for the period May through October are shown in figure 8. This curve has been plotted as an average of all data collected in a total of 46 untreated establishments, all very similar to the 11 treated establishments and chosen to be representative of the city as a whole. There were 356 rats used in all, with each point on the curve determined by examining from 31 to 88 rats. The results compare favorably with normal population curves calculated by Cole (*1*) for this species in Savannah, Ga., for the years 1932 and 1933, and also with the *X. cheopis* curve for Jacksonville, Fla., for 1934 as reported by Rumreich and Wynn (*2*). Figure 8 also shows the average number of *X. cheopis* per rat (this arithmetic mean being used as an index to the ectoparasite population throughout this study) for the 11 treated establishments which have been plotted in the proper position with respect to the date scale. Since the 11 studies were not all started at the same time, it was necessary to compute a mean trapping date for each study period. These mean dates are

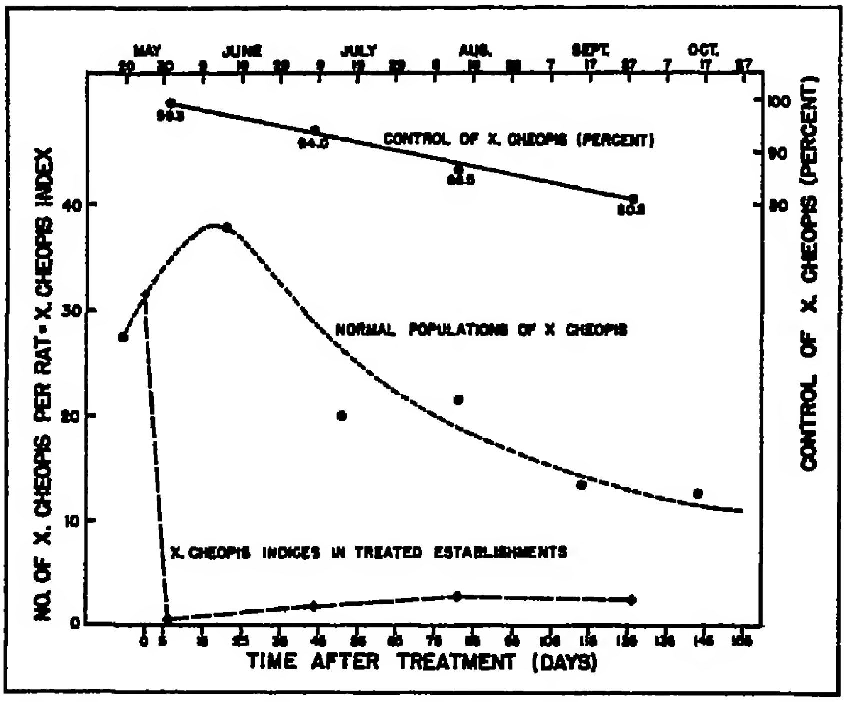

FIGURE 8.—Control of *Xenopsylla cheopis* fleas with 10-percent DDT dust.

listed in table 1. Each plotted index is the average for all of the establishments falling in each study period. The mean treatment date was May 25, as shown in figure 8. Percentage control figures have been computed, using the *X. cheopis* index obtained from treated establishments, and normal *X. cheopis* population as determined by sampling untreated establishments, for each study period.

TABLE 1.—*Results of DDT dusting for rat fleas, May 1 to Nov. 1, 1945*

Number of days after treatment	Mean trapping date	Number of live rats examined	*Xenopsylla cheopis*			Total fleas		
			Number	Index	Percentage control	Number	Index	Percentage control
Pretreatment	May 19	70	1,927	27.5	----------	2,721	38.9	----------
5-11	May 30	59	12	.2	99.3	14	.3	99.5
28-58	July 8	50	86	1.7	94.0	87	1.7	(1)
63-94	Aug. 14	49	125	2.6	86.5	132	2.7	(1)
98-162	Sept. 28	48	121	2.3	80.8	127	2.6	(1)

[1] Species of fleas encountered other than *Xenopsylla cheopis* (Rothschild) were: *Nosopsyllus fasciatus* (Bosc), *Leptopsylla segnis* (Schönherr), *Echidnophaga gallinacea* (Westwood), and *Ctenocephalides felis* (Bouché). These species made up a very minor proportion of the total population in both treated and untreated establishments between June 15 and November 1, 1945. Their numbers were too few to enable normal population trends to be determined, and consequently the degree of control could not be figured after the 5-11-day post-treatment period. However, on the basis of initial control, at a time when the population was still relatively high, it is thought that subsequent degrees of control would approximate that for *X. cheopis*.

As indicated on the graph (fig. 8), the initial control achieved against *X. cheopis* was 99.3 percent. Control falls off approximately 5 percent each month during the 4 months following dusting. It should be emphasized that the spectacular control of *X. cheopis* (and of other fleas in the initial period) was very consistent in all of the treated establishments (table 2).

FIGURE 6.—Operation of large hand-shaker duster along typical open rat runway.

FIGURE 7.—Operation of small hand-shaker duster in an out-of-the-way runway.

TABLE 2.—*Initial results of DDT dusting for rat fleas, May 5 to June 27, 1945*

Type of establishment	Pre- and post-treatment periods	Number of live rats examined	Indices: *Xenopsylla cheopis*	*Nosopsyllus fasciatus*	*Leptopsylla segnis*	*Echidnophaga gallinacea*	*Ctenocephalides felis*	Total fleas
Wholesale grocery	Pretreatment	8	10.0	1.7	16.5	0	0.1	28.4
	5-7 days	4	0	0	0	0	0	0
Poultry hatchery	Pretreatment	2	30.0	0	0	.5	0	30.5
	6-11 days	3	0	0	0	0	0	0
Wholesale grocery	Pretreatment	10	42.6	0	22.1	13.5	1.7	79.9
	7-8 days	8	1.0	0	0.1	0	0	1.1
Do	Pretreatment	5	5.8	1.2	8.4	.2	0	15.6
	6 days	2	.5	.5	0	0	0	1.0
Produce and poultry company	Pretreatment	7	5.1	.1	1.0	0	.1	6.4
	5-9 days	6	0	0	0	0	0	0
Feed and pet store	Pretreatment	5	28.6	.4	0	.2	1.4	30.6
	10 days	1	1.0	0	0	0	0	1.0
Poultry company	Pretreatment	7	40.0	1.0	8.6	14.3	5.0	68.9
	5-6 days	6	0	0	0	0	0	0
Retail grocery	Pretreatment	8	57.5	0	0	0	0	57.5
	5-6 days	10	.1	0	0	0	0	.1
Do	Pretreatment	6	22.7	.2	0	0	0	22.8
	7-9 days	6	.2	0	0	0	0	.2
Restaurant	Pretreatment	8	29.5	0	0	0	.3	29.8
	5 days	7	0	0	0	0	0	0
Retail grocery	Pretreatment	4	10.2	0	0	0	0	10.2
	7-10 days	6	0	0	0	0	0	0
Mean indices	Pretreatment	70	27.5	.4	6.6	3.4	.9	38.9
	5-11 days	59	.2	.01	.01	0	0	.3

TABLE 3.—*Results of DDT dusting on mites and lice infesting rats, May 5 to June 27, 1945*

Type of establishment	Pre- and post-treatment periods	Number of live rats examined[1]	Mite indices: *Liponyssus bacoti*	*Echinolaelaps echidninus*	*Laelaps hawaiiensis*	*Uropoda* species	Total mites	Louse index—*polyplax, spinulosa*	Total ectoparasite index, including fleas
Wholesale grocery	Pretreatment	8	21.9	0	0	0	21.9	0.1	50.4
	5-7 days	4	45.0	0	0	0	45.0	0	45.0
Poultry hatchery	Pretreatment	2	5.0	0	0	0	5.0	6.0	41.5
	6-11 days	3	0	0	.3	0	.3	0	.3
Wholesale grocery	Pretreatment	10	50.6	0	0	0	50.6	11.4	141.9
	7-8 days	8	17.5	0	0	.3	17.8	.3	19.1
Do	Pretreatment	5	50.0	0	.8	0	50.8	13.4	79.8
	6 days	2	5.0	0	0	0	5.0	0	6.0
Produce and poultry company	Pretreatment	7	0	0	.6	5.3	5.9	24.0	36.3
	5-9 days	6	.2	0	0	.8	1.0	5.2	6.2
Feed and pet store	Pretreatment	5	7.6	0	84.0	.2	91.8	83.2	205.4
	10 days	1	0	0	0	0	0	0	1.0
Poultry company	Pretreatment	7	1.0	0	1.9	0	2.9	10.0	81.7
	5-6 days	6	5.8	0	0	.4	6.2	22.8	29.3
Retail grocery	Pretreatment	8	.1	33.1	.4	.1	33.8	2.8	94.0
	5-6 days	10	.7	1.2	0	0	1.9	.2	2.2
Do	Pretreatment	6	19.0	.5	0	0	19.5	.3	42.7
	7-9 days	6	3.7	0	0	.3	4.0	.2	4.3
Restaurant	Pretreatment	8	14.5	0	5.6	.1	20.3	5.0	55.0
	5 days	7	14.7	0	0	0	14.7	1.1	15.9
Retail grocery	Pretreatment	4	.5	0	.3	.5	1.3	8.2	19.8
	7-10 days	6	0	0	0	.5	.5	5.3	6.2
Mean indices	Pretreatment	70	17.4	3.8	7.0	.6	28.8	13.5	81.2
	5-11 days	59	8.4	.2	.02	.3	8.9	3.6	12.8

[1] All rats here indicated were caught over a total period of 27 days and over a mean period of 11 days.

Mite and louse populations showed, in both treated and check establishments, a large variation which was of a magnitude too great to make an exact population analysis possible in this study. An initial control of these species, however, is indicated for the 5–11-day period following treatment (table 3). These figures must be considered approximate because of the normally extreme variation which occurs in the number of mites and lice found on individual rats. It does not seem justified to indicate the degree of control attained on the basis of the data at hand.

SUMMARY

Field studies were initiated to determine the degree of control effected against rat ectoparasites by treating rat-infested premises with 10-percent DDT dust. Eleven study premises were trapped before treatment, 1 week following treatment, and at approximately monthly intervals thereafter. From rats trapped in untreated premises, only the oriental rat flea, *X. cheopis*, was found in sufficient numbers and uniformity of distribution to permit an analysis of normal seasonal populations.

Treatment was effected by blowing the 10-percent DDT dust into burrows and enclosed harborages with a cyanogas foot-pump duster and by sifting a light layer of dust along rat runways with hand-shaker dusters.

Spectacular and consistent control of *X. cheopis* resulted in all 11 establishments, with the control percentage dropping off from an initial 99.3 percent at the rate of approximately 5 percent per month for the 4 months following treatment.

A degree of control was achieved against rat mites and rat lice, but data were insufficient to justify the statement of a definite percentage.

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OBSERVATIONS ON THE NIGHTTIME RESTING AND BITING HABITS OF ANOPHELINE MOSQUITOES IN DDT-TREATED AND -UNTREATED BUILDINGS [1]

By Clarence M. Tarzwell, *Senior Assistant Sanitarian (R)* and Frank W. Fisk, *Sanitarian (R), United States Public Health Service*

Laboratory cage tests and controlled experiments in houses have clearly demonstrated that residual-spray deposits of DDT are lethal to mosquitoes for considerable periods. Although these tests gave

[1] From Communicable Disease Center, Technical Development Division (Savannah, Ga.), States Relations Division.

valuable information on the durability of DDT residual deposits, they did not give information on the mortality of malaria mosquitoes naturally entering treated dwellings in search of a blood meal. In order to secure a lethal dose of DDT from residual deposits, mosquitoes must actually touch the material and be exposed to it for a considerable period. This period has been shown to vary (*1*), depending on the temperature, age of treatment, density and distribution of the DDT crystals, and the resistance of the individual mosquitoes. Thus, the habits of the mosquitoes in question are of prime importance in determining the likelihood of their being exposed to DDT deposits for a sufficient time to produce death. If, after entering a treated house, mosquitoes spend all or most of their time flying around, or if they proceed directly to a host, feed, and leave immediately, it is obvious that they would not secure a lethal exposure to the DDT. While it has been known for some time that *Anopheles quadrimaculatus* mosquitoes spend most of their daytime hours resting quietly in dark, damp, cool, quiet places, no detailed information has been noted on their hour-to-hour activities in buildings during the night or on the length of time they rested on walls or ceilings before or after feeding. It was to gain some idea of these activities that the studies herein described were undertaken.

PROCEDURE

Observations on the nighttime behavior and resting habits of anopheline mosquitoes were conducted in rooms especially prepared for the study. The walls and ceilings of these rooms were marked off by means of chalk lines into rows of squares, each of which had an area of approximately 1 square yard. Each row was designated by a letter and each square by a number, so that they could be easily located. Scale drawings were made of the walls and ceilings, showing the squares and all surfaces upon which a mosquito might rest. These charts were used for plotting the exact location of all mosquitoes observed during the night studies. For rapidity of observation the room was divided into sections, and each observer was furnished with a drawing of the section assigned to him.

The rooms used in the study had one or more windows and doors which were left open so that mosquitoes could enter or leave at will. A cow, goat, or the observers themselves served as attractants for the mosquitoes.

Each night study was divided into observation periods which were spaced at intervals ranging from 15 minutes to over an hour, depending on the number of mosquitoes to be counted and their degree of restlessness. All observation periods were numbered consecutively throughout the night. These numbers were used as subscripts to the

symbols representing the mosquitoes, to indicate the periods when the mosquito was first and last seen. At each counting period, the observer used a flashlight to cover systematically the area corresponding to that appearing on the chart. He began at the same spot each time and plotted the location of all resting mosquitoes seen by placing a symbol on the chart at the proper point. A different symbol was used to indicate the type of mosquito seen (whether anopheline or culicine, engorged or unengorged). During each observation period, the locations of all mosquitoes were checked against the symbols on the chart, and if a mosquito corresponded with a point plotted for a preceding period, it was presumed to be the same mosquito. If a mosquito was not indicated by a symbol on the chart, it was judged to have just entered the building, and a new mosquito locus was plotted on the chart, and given a subscript indicating the number of the period. If there was no mosquito for a previously plotted symbol, the number of the period in which it was last seen was used as the second subscript number to indicate the length of the resting period. Thus, an analysis of the data from the charts of all observers on a given night enabled the computation of the average resting period for each type of mosquito noted, as well as the actual number of each type present at various times of the night. Since every mosquito which shifted resting positions during the night accounted for more than one mosquito locus, the total number of mosquito loci plotted throughout the night was always greater than the total number of mosquitoes actually entering the room. To reduce this error to a minimum, care was exercised in the use of the flashlights.

These overnight studies were carried out in two types of buildings, a small cow barn before and after treatment, and a test room 3 and 4 months after treatment.

Two all-night observations were conducted in the small cow barn before treatment, and a third observation was made after spraying. During these observations, a cow was tethered in the building as a bait animal. The pretreatment counts were made on the nights of September 1 and 5, 1944, and the posttreatment count on the night of September 25, 1944. The treatment consisted of 200 mg. of DDT per square foot. Studies in the test room were carried out in late September 1945, 4 months after a treatment at the rate of 117 mg. of DDT per square foot. A crated goat was used as a bait animal, in addition to the three observers who were present during the test. All windows were left open and unscreened, to allow free movement of the mosquitoes into and out of the room. Early in the evening, observations were made at hourly intervals, but these intervals were reduced to 15 minutes when it became apparent that the mosquitoes were all moving at least once during each period.

Five overnight studies were made on the biting habits and knockdown of mosquitoes in this same test room 3 months after spraying. During these studies, the investigator spent the night on a cot without a bed net, so that the mosquitoes which entered could feed on him at will. He noted the number of biting attempts and made gross observations throughout the night as to the number and kind of mosquitoes in the room. During the first three studies, an exit trap was placed in one window, while the other two windows were left open on the first night and provided with inlet cones on the second and third nights. The inlet windows were screened an hour before dawn to prevent the entrance of mosquitoes seeking daytime resting places. In the last two studies, no traps were used and the windows were not screened to prevent the entrance of mosquitoes just before dawn. All mosquitoes were collected from the test room and the exit trap at approximately 9 o'clock the following morning and classified as to species and condition. Precipitin tests were made on all fully engorged females for the determination of blood meals.

Two similar studies were made, with a cow as bait, in a barn which had been sprayed 11 months previously at the rate of 200 mg. of DDT per square foot. Sheets were spread on the floor during the night to catch the moribund mosquitoes. These were gathered up at 5:30 a. m. so as to retain all mosquitoes knocked down during the night, while eliminating those mosquitoes entering in search of a daytime resting place.

RESULTS AND DISCUSSION

The numbers of engorged and unengorged *A. quadrimaculatus* females noted in the cow barn during the two prespraying studies made in September 1944, are shown in table 1. In each of the studies engorged mosquitoes accounted for only about 14 percent of the total number observed, even though a cow was in the barn throughout

TABLE 1.—*Results of nighttime counts of* Anopheles quadrimaculatus *mosquito loci in an untreated barn, with calculated average resting periods for unengorged and engorged females*

Date	Unengorged females			Engorged females		
	Number	Resting period (in minutes)		Number	Resting period (in minutes)	
		Average	Standard deviation		Average	Standard deviation
Sept. 1-2	1,227	184±4	±138	211	180±9	±129
Sept. 5-6	770	140±3	±86	134	155±10	±115
Total	1,997	167±3	±122	345	170±7	±124

the night. Contrary to expectations, the observed resting period of the unengorged and engorged mosquitoes was not significantly different. For the two nights, the observed average resting period for the unengorged mosquitoes was 167 minutes, and for the engorged 170 minutes.

There was considerable variation in the observed resting period of the mosquitoes, some remaining in place for only a few minutes, others remaining in place for over 10 hours. It was evident that some mosquitoes moved due to the disturbing influence of the lights used in counting. Since the actual time that each mosquito rested on a particular spot was always greater than the observed resting period, the averages are somewhat low. Further, the calculation of these averages was complicated by the fact that over a third of the total number, or some 909 mosquitoes, did not move after alighting and were still in place at 7 a. m. and remained in the same position during most of the day. Because it was desired to obtain the average nighttime resting period, it was arbitrarily decided to include only the period up to 7 a. m. in the calculation of the average resting periods.

The posttreatment study was conducted later in September and on a somewhat cooler night, during which the temperature dropped to 62° F. As a result, a much smaller number of mosquitoes entered the barn. The number of mosquitoes observed resting in the barn and their average resting periods are shown in table 2.

TABLE 2.—*Numbers of* Anopheles quadrimaculatus *females resting in a DDT-sprayed barn, with average resting periods*

Date	Unengorged females			Engorged females		
	Number	Resting period (in minutes)		Number	Resting period (in minutes)	
		Average	Standard deviation		Average	Standard deviation
Sept. 24-25	59	40±3	±24	27	33±4	±20

As indicated, the resting period after treatment was greatly shortened, possibly due to the irritating effect of the DDT deposit. Differences in the resting periods before and after treatment and the percentage of the total mosquitoes resting for stated periods are shown graphically in figure 1. Although the average resting period of *A. quadrimaculatus* on an untreated surface is considered adequate for obtaining a lethal dose of DDT under most conditions, it is apparent that the normal resting periods do not prevail after treatment

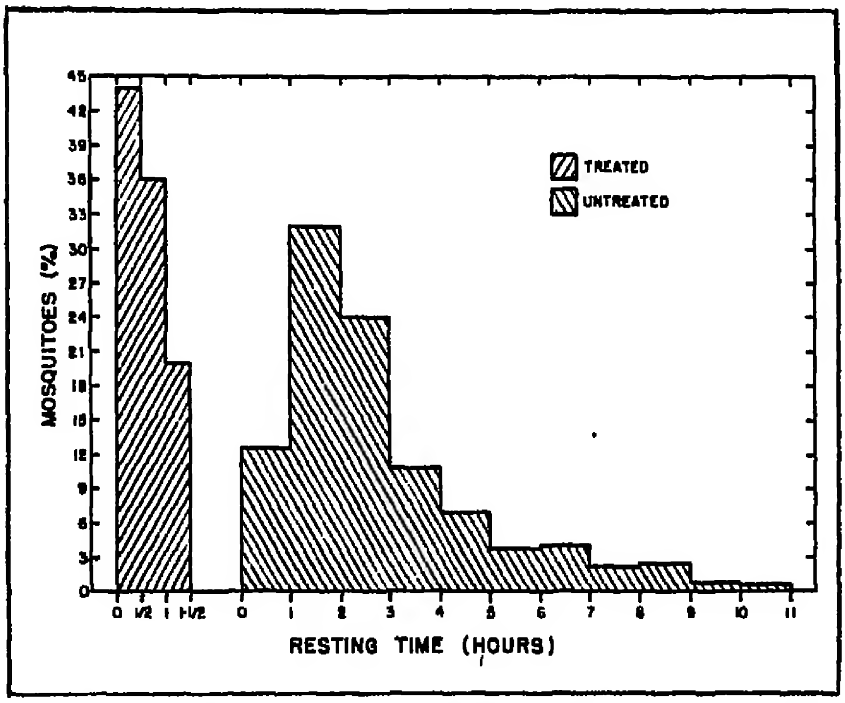

FIGURE 1.—Nighttime resting periods of *Anopheles quadrimaculatus* mosquitoes in a cow barn before and after treatment with 200 mg. of DDT per square foot as indicated by the percentages resting for stated intervals.

and cannot be used in determining exposure to sprayed surfaces. However, it is indicated that, in general, a large percentage of the mosquitoes will rest on treated surfaces for a period sufficient to insure a lethal dose. The fact that before treatment only about 14 percent of the observed *A. quadrimaculatus* females were engorged, even though a cow was continually present in the barn, indicates that many of those naturally entering buildings for the purpose of feeding rest on walls for some time before feeding, as well as after they have fed. In the treated barn about 31 percent of the resting females were engorged. This greater percentage of engorged females in the sprayed barn may indicate that many mosquitoes which entered and rested on the walls temporarily before biting, were so irritated that they left without biting, thus increasing the ratio of fed to unfed individuals. This may be the explanation for the lack of mosquito annoyance experienced by occupants of treated houses immediately after spraying, who often report freedom from bites for the first week or two. Following this there is a period of several weeks during which the annoyance gradually increases, even though a high percentage of the biting mosquitoes are subsequently killed by exposure to sprayed surfaces.

At dusk a considerable number of mosquitoes entered the barn in a few minutes; this occurred both before and after treatment. Before treatment the number of mosquitoes resting in the barn increased progressively throughout the night (fig. 2). The average number of mosquitoes present each hour and the increase in number each hour

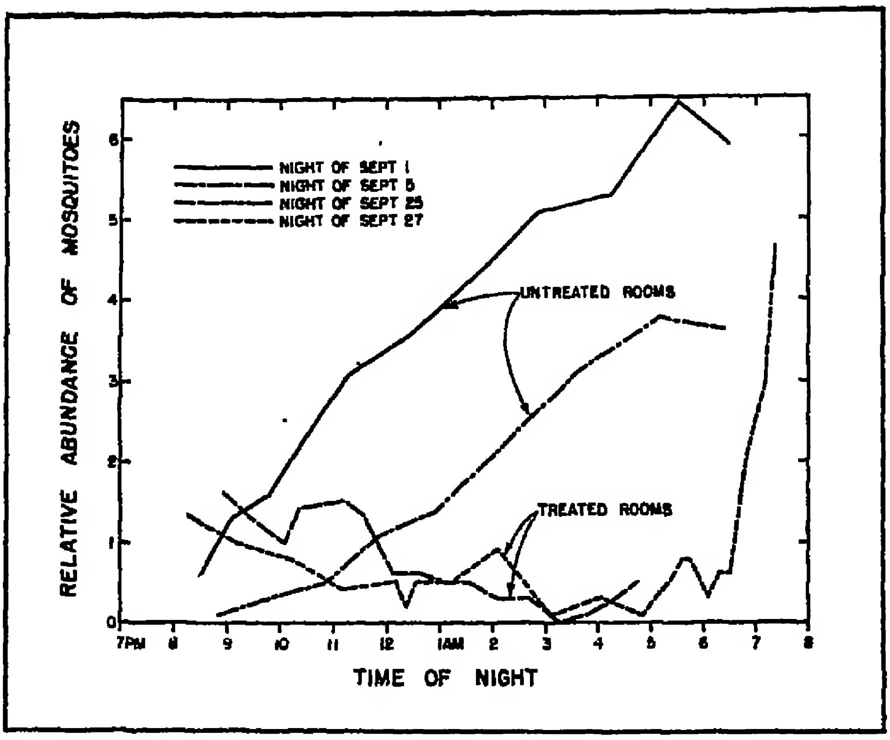

FIGURE 2.—A comparison of the behavior and trends in abundance of nighttime resting *Anopheles quadrimaculatus* mosquitoes in untreated and treated buildings. Each unit on the vertical scale represents 100 mosquitoes for the untreated rooms and 10 mosquitoes for the treated rooms.

are shown in table 3. The number of unengorged mosquitoes increased throughout the night, with the greatest increase occurring between 1:30 and 2:30 a. m. The engorged mosquitoes decreased steadily after 11:30 p. m.

TABLE 3.—*Observed numbers of* Anopheles quadrimaculatus *mosquitoes resting in an untreated barn each hour of the night (average of 2 studies), and the increase each hour*

Time	Unengorged females	Increase	Engorged females	Increase	Total females	Total increase
8:30 p. m.	22	22	12	12	34	34
9:30 p. m.	60	38	25	13	85	51
10:30 p. m.	93	33	41	16	134	49
11:30 p. m.	129	36	63	22	192	58
12:30 a. m.	185	56	61	−2	246	54
1:30 a. m.	239	54	58	−3	297	53
2:30 a. m.	307	68	55	−3	362	75
3:30 a. m.	365	58	48	−7	411	49
4:30 a. m.	408	45	44	−4	452	41
5:30 a. m.	465	57	43	−1	508	46
6:30 a. m.	440	−25	46	3	486	−22

After treatment conditions were reversed. Following the rapid influx at dusk (fig. 2), the number of mosquitoes in the barn did not increase, and after midnight decreased. The number counted at each observation period is shown in table 4. Differences in the number of mosquitoes present during each hour of the night before and after treatment are shown graphically in figure 2. The reduction of the number of resting mosquitoes in a treated building, as indicated in figure 2, might well be one reason for the protection afforded by DDT residual sprays.

TABLE 4.—*Numbers of* Anopheles quadrimaculatus *mosquitoes resting in a DDT-treated barn at various times during the night and the increase or decrease between periods*

Time	Unengorged females	Increase	Engorged females	Increase	Total females	Total increase
9 p. m.	14	14	2	2	16	16
9:30 p. m.	11	−3	2	0	13	−3
10 p. m.	6	−5	4	2	10	−3
10:30 p. m.	10	2	4	0	14	1
11 p. m.	12	2	3	−1	15	1
11:30 p. m.	11	−1	2	−1	13	−2
12 m.	3	−8	3	1	6	−7
12:30 a. m.	3	0	3	0	6	0
1 a. m.	3	0	2	−1	5	−1
1:30 a. m.	3	0	2	0	5	0
2 a. m.	2	−1	1	−1	3	−2
2:30 a. m.	2	0	1	0	3	0
3:15 a. m.	0	−2	0	−1	0	−3
3:45 a. m.	1	1	0	0	1	1
4:15 a. m.	2	1	1	1	3	2
4:45 a. m.	2	0	3	2	5	2

Observations in a treated room indicated much the same conditions as those observed in the barn after treatment. Following the rapid influx of mosquitoes at dusk, the mosquitoes rested only a short period and left. This condition existed until about 6:30 a. m., when there was an influx of mosquitoes in search of daytime resting places (fig. 2). The number of mosquitoes observed at each counting period is shown in table 5.

TABLE 5.—*Observed numbers of* Anopheles quadrimaculatus *mosquitoes resting in a DDT-treated room at various times during the night*

Time	*Anopheles quadrimaculatus* females			Culicines
	Unengorged	Engorged	Total	Total
8:20 p. m.	13	0	13	22
9:05 p. m.	10	0	10	15
10:05 p. m.	7	1	8	0
11:05 p. m.	3	1	4	1
12:10 a. m.	4	1	5	1
12:20 a. m.	2	0	2	1
12:35 a. m.	5	0	5	2
12:50 a. m.	5	0	5	2
1:15 a. m.	5	0	5	4
2:05 a. m.	8	1	9	3
3:05 a. m.	1	0	1	1
4:05 a. m.	3	0	3	4
4:50 a. m.	1	0	1	0
5:20 a. m.	3	2	5	6
5:35 a. m.	7	1	8	3
5:50 a. m.	8	0	8	2
6:05 a. m.	3	0	3	2
6:20 a. m.	6	0	6	0
6:35 a. m.	6	0	6	2
6:50 a. m.	17	4	21	3
7:05 a. m.	17	13	30	5
7:20 a. m.	24	23	47	3

These results also indicate that in treated buildings the mosquitoes quickly become irritated, so that their resting period is reduced to a matter of minutes. Since no anopheline mosquitoes and only one of the culicines remained beyond the 15-minute intervals, it is assumed

that the maximum resting period is less than 15 minutes. Engorged mosquitoes comprised 23 percent of the observed mosquitoes..

The results of the five overnight biting and knock-down studies which were conducted in the test room 4 months after treatment at the rate of 117 mg. of DDT per square foot are summarized in table 6. In the first three studies the entrance windows were screened an

TABLE 6.—*Numbers of naturally entering mosquitoes, active and knocked-down, recovered from a test room which had been sprayed 4 months previously with DDT, and the source of their blood meals as indicated by precipitin tests*

Group	*Anopheles quadrimaculatus*			Culicines		
	Engorged	Unengorged		Engorged	Unengorged	
	Females	Females	Males	Females	Females	Males
GROUP 1						
(3 studies)						
(Windows closed before dawn)						
Down on floor	5 H,[1] 1 U	41 *A. cr.* 2	1	1 H, 4 N	129	....
Alive in room	....	....	....	....	1	....
Down in traps	3 N, 2 U	15	....	....	14	....
Alive in traps	1 H, 1 N	10	....	....	3	....
GROUP 2						
(2 studies)						
(Windows not closed)						
Down on floor	1 H, 7 E, 80 B, 7 N, 9 U	*56	1	3 H, 1 N, 1 U	11	1
Alive in room	4 H, 2 E, 85 B, 6 N, 6 U	*45	....	....	2	1

[1] Supplementary key:
H =Human.
U =Unsatisfactory for test.
N =No reaction.
A. cr.=*Anopheles crucians.*
E =Equine.
B =Bovine.
* =Many were partly engorged.

hour before dawn to shut out those mosquitoes in search of daytime resting places. When this was done, no live *A. quadrimaculatus* mosquitoes and only one live culicine mosquito were found in the room at the 9 a. m. inspection. A total of 34 dead and 15 live mosquitoes were taken in the exit trap. The live mosquitoes were killed for the determination of their blood meals. A total of 18 engorged females, only one of which was alive at the time of inspection, was recovered from the three studies. Of these only six gave positive blood reactions and all of these were for human blood, presumably that of the observer. A total of 215 unengorged mosquitoes was taken. Thus, the engorged mosquitoes comprised only about 7 percent of the total taken. These results indicate considerable protection against biting.

In the last two studies all windows were entirely open and no attempt was made to keep out the predawn flight of *A. quadrimaculatus*. At the 9 a. m. inspection only about half of the mosquitoes had been knocked down, which would seem to indicate that many mosquitoes had entered in search of daytime resting places and sufficient time had not yet elapsed for them to be knocked down. (The KD_{50} for daytime releases of mosquitoes in the room was 120 minutes at that time.) Of the total active and morbid *A. quadrimaculatus* mosquitoes recovered from the room, 41 percent were engorged sufficiently to permit precipitin tests, which showed a number of blood sources, as indicated in table 6. Since bovine blood predominated, it is evident that many entered to rest rather than to feed. However, four of those which were still alive had fed on human blood, whereas only one which was down on the floor had fed on human blood. Over half of the recovered anopheline mosquitoes were engorged, and approximately 10 percent of these had fed on human blood.

In every test the operator reported several times more bites than the number of mosquitoes fully engorged with human blood which were recovered. This was due in part to the escape of the engorged mosquitoes, as indicated by the numbers taken in the exit traps when these traps were in place, and perhaps to several attacks by the same mosquito in becoming fully engorged.

The results of the two overnight biting and knock-down studies in a cow barn sprayed 11 months previously are summarized in table 7.

TABLE 7.—*Number of mosquitoes knocked down in a small barn sprayed 11 months previously with 200 mg. DDT per square foot with the source of blood meals indicated (totals from 2 nights' studies)*

Species	Engorged females	Unengorged females	Males
A. quadrimaculatus	110 bovine, 18 negative, 2 unsatisfactory	10	1
Culicines	24 bovine, 1 avian, 14 negative, 14 unsatisfactory	21	1

These results show that over 11 months after treatment a considerable number of mosquitoes are knocked down before they are able to leave. As all the engorged mosquitoes satisfactory for precipitin tests had been feeding on the cow, it is probable that they had fed in the barn. Among the mosquitoes which had been knocked down and recovered from the barn floor, the engorged ones outnumbered the unengorged by about 2½ to 1.

SUMMARY

Anopheles quadrimaculatus mosquitoes which enter buildings to feed rest on walls or ceilings for considerable periods before as well as after feeding.

The observed nighttime resting period of unengorged and engorged *A. quadrimaculatus* females in an untreated building was not significantly different. The resting period varied greatly, ranging from a few minutes to over 11 hours.

In treated buildings the observed resting period was much shorter than that for untreated buildings, and the range was much less, varying from a few to 90 minutes. The average observed resting period for unengorged and engorged *A. quadrimaculatus* females was not significantly different, being 40±3 minutes for the former and 33±4 minutes for the latter.

After treatment, the percentage of engorged females resting on the walls increased from 14 to 31 percent, perhaps indicating that many of the unengorged mosquitoes are irritated by the DDT and leave before they attempt to bite. Immediately after spraying, irritation is produced in such a short time that considerable protection against biting is afforded.

In the untreated building, the number of *A. quadrimaculatus* females increased throughout the night, reaching a maximum about an hour before daylight, whereas after treatment, the largest number was present just after the influx at dusk, and only a small number of mosquitoes were present at any time during the remainder of the night.

ACKNOWLEDGMENT

This study was carried on with the active assistance of several members of the staff of the Carter Memorial Laboratory. Special thanks are due Senior Assistant Engineer (R) Earl H. Arnold, Senior Assistant Engineer (R) Harry Stierli and Senior Assistant Sanitarian (R) Richard W. Fay for assistance in making the night studies. Sanitarian (R) S. W. Simmons made the project possible and gave valuable advice and assistance in the work. Engineering Aide Fred Freeman gave active assistance in several phases of the work. We are indebted to Junior Assistant Sanitarian (R) Dorothy Fawcett for the determination of the blood meals of the mosquitoes.

REFERENCE

(*1*) Tarzwell, C. M., and Stierli, H.: The evaluation of DDT residual sprays for the control of anopheline mosquitoes in dwellings. Pub. Health Rep. Supplement No. 186, pp. 35–48 (1945).

COMPARATIVE STUDIES OF DDT DUSTS, DDT-OIL SPRAYS, AND PARIS-GREEN DUSTS USED ROUTINELY IN ANOPHELINE LARVAE CONTROL [1]

By WILLIS V. MATHIS, *Assistant Sanitarian (R)*, FREDERICK F. FERGUSON, *Senior Assistant Sanitarian (R)*, and S. W. SIMMONS, *Sanitarian (R)*, *United States Public Health Service*

This paper presents an evaluation of the effectiveness of DDT larvicides in a general malaria-control program.[2] The use of DDT as a dust and as a spray, has been compared to that of paris-green dust. The Savannah, Ga., Malaria Control Area was selected for a large-scale test of the use of DDT as a means of controlling anopheline mosquitoes. This area consists of 41 square miles in which 255 acres and 388,400 feet of small ditches were treated with various larvicides from March 1 to October 19, 1945. The area was divided into three regions of similar breeding characteristics from the standpoint of ease and cost of larviciding. One of the above types of larvicides was used in each region for an entire anopheline-mosquito-breeding season. During the early part of the 1945 season, a DDT-oil-water emulsion applied at 15 gallons of total emulsion per acre was used as a spray; later a DDT-oil mist was applied at the rate of 1 gallon per acre. The DDT and paris-green dusts were dispersed at the rate of 10 pounds of finished dust per acre. In all types of applications an attempt was made to disperse 0.1 pound DDT or 1 pound paris green per acre. Regular larviciding procedures of Malaria Control in War Areas were followed during the study, employing labor-grade personnel. Preliminary training was necessary in the techniques of handling the modified equipment.[3]

Pretreatment larval surveys were made of the stations under control. Posttreatment surveys were made 24 hours and 1 week after treatment. Only stations having an adequate larval population were used in the study. In this work, no attempt was made to determine the effects of DDT on wildlife, other than by very general observations. These observations indicated that considerable numbers of the surface insects were killed by DDT-in-oil mists. No harmful effects were noted by the use of DDT dust.[4]

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[1] From Communicable Disease Center, Technical Development Division (Savannah, Ga.), States Relations Division.

[2] The Georgia State Health Department has cooperated in these tests involving the use of DDT in controlling anopheline mosquito larvae. The authors express their thanks to Mr. L. G. Lenart, Director, State Malaria Control, William Legwen, Sanitary Engineer (R), Assistant Director, and H. F. Johnson, Assistant Engineer (R), Area Supervisor, Savannah, Ga., for their cooperation in this study.

[3] See the discussion of the equipment and techniques involved in Ferguson, F. F., et al.: Control of anopheline mosquito larvae by use of DDT-oil mists (to be published in Public Health Reports).

[4] See the discussion in Tarzwell, C. M., et al.: Effects of DDT mosquito larviciding on wildlife (to be published in Public Health Reports).

DDT DUSTS

The first formula used as a larvicide was 1-percent DDT in a kaolin-type clay. Approximately 10 pounds of finished dust (i. e., 0.1 pound of DDT) per acre was applied with a rotary hand duster. During the time this formula was used, the larval populations were sampled without any distinction as to the instars. From the results obtained in 10 treatments, using only those counts in which the pretreatment populations averaged 0.25 or more larvae per dip, an average reduction of 99 percent was noted 24 hours after treatment. No residual toxicity was detected in the five stations on which a weekly count was taken, each of these stations showing reinfestation when the weekly counts were made. The average sample after 1 week was 43 percent of the original count. As the season progressed, pyrophyllite was substituted for the kaolin as the diluent and the larval counts were recorded by separate instars. Table 1 gives the results of these tests.

TABLE 1.—*Summary of results of counts, by instars, before and following treatment with 1-percent DDT in pyrophyllite, applied at the rate of 10 pounds finished dust per acre*

Instars	Pretreatment count		24 hours after treatment		Percentage reduction at 24 hours	1 week after treatment		Percentage of original pretreatment sample
	Dips	Larvae/dip	Dips	Larvae/dip		Dips	Larvae/dip	
First	1,524	0.925	1,604	0.126	86	1,240	0.792	86
Second	1,524	.457	1,604	.110	76	1,240	.416	91
Third	1,524	.109	1,604	.010	91	1,240	.056	51
Fourth	1,524	.060	1,604	.006	90	1,240	.034	57
Total	1,524	1.551	1,604	.252	84	1,240	1.298	84

Reduction of the second instar was less than that of any other, but it is doubtful that this was due to higher resistance, rather than to errors in instar determinations in the field. In the individual treatments, a few larval populations evidenced very little reduction, and some showed an increase over the original number of larvae found. The cause of these poor population reductions is conjectural. However, it occurred during a period of rainy weather and in some of these tests, rain fell almost immediately after treatment. Other treatments under similar circumstances showed excellent reductions. In order to eliminate possible errors in distinguishing the four instars, the larvae were analytically divided into small (first and second) and large (third and fourth) instars. This produced an average reduction of 83 percent of the small, and 91 percent of the large larvae at the 24-hour post-treatment sampling. As in the first series of tests made with DDT dust, no indication of any residual toxicity was noticed, as the weekly sampling indicated that the small larvae had increased to 76 percent

and the large larvae to 59 percent of the original sample. There was some evidence that the treatments with the kaolin diluent for the DDT were more effective than with those using the pyrophyllite diluent. However, both seemed to give satisfactory control.

PARIS-GREEN DUST

A dust consisting of 10-percent paris green in lime applied at the rate of 1 pound of paris green per acre, was used throughout the season on the stations designated for this treatment. The same total amount of dust (10 pounds finished dust per acre) and the same type of rotary hand duster was used in these treatments as was used with DDT dust. During the first period, 19 applications were made and the larval counts were made without any distinction as to respective instars. The results indicate that 24 hours after treatment, a 64-percent reduction of the larvae had been obtained as compared with a 99-percent reduction due to DDT-kaolin. This does not necessarily mean unsatisfactory control of large larvae, for in many counts considerable numbers of the remaining larvae were small. It is usually held that under field conditions, paris-green dust does not give as high a kill of small larvae as it does of the large ones. This is presumably based on the inability of small larvae to ingest paris-green particles. Table 2 contains the results, by instars, obtained with 26 additional applications during the period that the DDT-pyrophyllite dust was used.

TABLE 2.—*Summary of counts, by instars, before and following treatment with 10-percent paris green in lime, applied at the rate of 10 pounds of finished dust per acre*

Instars	Pretreatment count		24 hours after treatment		Percentage reduction at 24 hours	1 week after treatment		Percentage of original pretreatment sample
	Dips	Larvae/dip	Dips	Larvae/dip		Dips	Larvae/dip	
First	1,468	1.106	1,519	0.327	70	1,171	0.877	79
Second	1,468	.291	1,519	.086	70	1,171	.232	80
Third	1,468	.092	1,519	.005	95	1,171	.046	50
Fourth	1,468	.048	1,519	.006	87	1,171	.015	31
Total	1,468	1.537	1,519	.424	72	1,171	1.170	76

In a majority of these tests, a satisfactory reduction of the large larvae was noted. No difference was found between the reduction of the first and the second instars. Some error may be indicated in the distinction between third and fourth instars which may account for the difference in percentage reduction in these instars. The samples taken 1 week after treatment show the degree of reinfestation, in comparison to the original samples, after 1 week. These

tests were made over approximately the same period as were the tests on DDT-pyrophyllite dust, and show an over-all reduction of 72 percent at 24 hours as compared with 84 percent for the DDT-pyrophyllite.

DDT IN OIL

The initial DDT-in-oil treatments were made with a quick-breaking emulsion. The oil phase was 1.25 percent DDT, 0.5 percent B–1956,[5] and 98.25 percent No. 2 fuel oil. One gallon of this concentrate was added to 14 gallons of water and applied at the rate of 15 gallons of finished emulsion per acre by the use of a knapsack sprayer, fitted with No. 4 or No. 5 orifice plates. As in the tests on other larvicides, the early-season larval counts were made without any distinction as to separate instars. In 10 such tests, an average reduction in larvae of 95 percent was noted 24 hours after the treatment was made. The weekly sampling indicated that the numbers of larvae had increased to 34 percent of the original number. The method of recording the larval counts was changed at the same time as in the other larvicides; also a new formula and method of application was instituted. This formula was 1.25 percent DDT and 0.5 percent B–1956 in No. 2 fuel oil and was applied at the rate of 1 gallon per acre without the addition of water. The pressure sprayer used was of the open-head type, with a capacity of 1½ gallons. The sprayers were initially charged with 1 gallon of material and during operation the pressure range was maintained at from 30 to 50 pounds per square inch. The sprayer was fitted with an atomizing nozzle[6] which gave a very fine mist spray, using the wind for further dispersion. A swath of approximately 20 to 30 feet was effectively covered at one time. Table 3 gives the results obtained in 12 applications using the oil-mist technique.

TABLE 3.—*Summary of results of counts, by instars, before and following treatment with DDT in fuel oil, applied at the total rate of 1 gallon per acre*

Instars	Pretreatment count		24 hours after treatment		Percentage reduction at 24 hours	1 week after treatment		Percentage of original pretreatment sample
	Dips	Larvae/dip	Dips	Larvae/dip		Dips	Larvae/dip	
First	771	0.873	806	0.017	98	520	0.190	22
Second	771	.454	806	.006	99	520	.083	18
Third	771	.121	806	.002	98	520	.008	7
Fourth	771	.115	806	.004	97	520	.006	5
Total	771	1.563	806	.029	98	520	.287	18

[5] An emulsifier-spreader, a product of the Rohm and Haas Co., Philadelphia, Pa.
[6] Marley 1H41 nozzle, a product of the Marley Co., Kansas City, Kans.

In these tests, a highly uniform reduction of all larval instars was obtained in all plots except one.

The larval counts made 1 week after treatment varied considerably. The number of small larvae (first and second instars) was only 18 percent, whereas the number of large (third and fourth instars) was 6 percent of the original number. It is doubtful if this reflects any residual toxicity from the treatments, for in a majority of the tests at the 1-week check, second-instar larvae were common and a few third and fourth instars were also found. In two tests, the total number of larvae found 1 week after treatment was almost as large as the original sample. The large larvae were found in areas which apparently had a 100-percent reduction of larvae after treatment. Therefore, the reinfestation would have had to ensue very soon after treatment. It is thought that the small number of larvae found 1 week after treatment was the result of the extremely high initial kill. Some stations were treated at weekly intervals throughout the season and larvae were still being found at the end of the season, after the treatments had been discontinued. As is shown in table 3, DDT-in-oil mist is apparently equally effective against each instar. There is no significant difference in the results obtained by the use of the emulsion formula (95-percent reduction at 24 hours and 34-percent reinfestation at 1 week) as compared to the oil-mist formula (98-percent reduction at 24 hours and 18-percent reinfestation at 1 week).

Table 4 is a summary of initial reduction in larval-instar populations and subsequent reinfestation 1 week after each type of treatment.

TABLE 4.—*Comparison of larval reduction 24 hours after treatment and reinfestation 1 week after treatment for DDT dust, paris green, and DDT-in-oil mist*

Instars	10-percent paris-green dust		1-percent DDT-pyrophyllite dust		1.25-percent DDT in fuel oil	
	Percentage reduction at 24 hours	Reinfestation at 1 week	Percentage reduction at 24 hours	Reinfestation at 1 week	Percentage reduction at 24 hours	Reinfestation at 1 week
First	70	79	86	86	98	22
Second	70	80	76	91	99	18
Third	95	50	91	51	98	7
Fourth	87	31	90	57	97	5
Total	72	76	84	84	98	18

On the Malaria Control in War Areas (M. C. W. A.) program, *Anopheles* control measures are considered satisfactory when the adult *A. quadrimaculatus* counts in all "A" stations[7] are maintained

[7] "A" stations are natural resting places located within one-quarter of a mile of regions under protection.

below 10 per station. By applying this criterion to the data obtained by the personnel of the Savannah control unit, satisfactory control was obtained in all regions. Only one "A" station showed 10 adults and this occurred only once. It is very difficult to compare the effectiveness of larvicides in different regions by comparing the adult counts; therefore, no attempt was made to get detailed information.

OPERATIONAL ASPECTS

The semimonthly progress reports of the Savannah Malaria Control Unit for 1945 were used as a source of comparative data on the different types of larvicides. The principal interest in these records was the dosage applied and the number of man-hours required to treat a unit area with the different larvicides. Table 5 gives the average dosage and man-hours for the two divisions into which M. C. W. A. divides the larval stations.

TABLE 5.—*Comparison of larviciding operations in terms of dosage of active ingredients and man-hours involved*

Larvicide	Ditches 10 feet or less in width		Ditches and ponds greater than 10 feet in width	
	M. H./100 linear feet	Pounds/100 linear feet	M. H./acre	Pounds/acre
DDT-oil emulsion	0.13	0.0016	4.10	0.05
DDT-oil mists	.06	.0038	1.70	.13
DDT dust	.10	.0050	3.74	.24
Paris-green dust	.09	.04	3.10	1.71

(All figures based on records from Mar. 1 to Oct. 19, 1945.)

In breeding areas 10 feet or less in width, it was found that the DDT-oil-mist formula required less time to treat a unit area than any other method used. Paris-green and DDT dusts required essentially the same time. The DDT-oil-water emulsion required the longest treatment time per unit area whereas the dosage rate, as compared to the other DDT treatments, was only from 30 to 40 percent as great. By computing the number of man-hours required to treat all stations with the 1-gallon-per-acre oil formula and comparing with similar computations for the dusts, it was found that a 36-percent saving in time would have been obtained by using oil.

In breeding areas greater than 10 feet in width, the same trend was followed, both as to the number of man-hours required to treat a unit area and also as to the dosage applied. Again, computations were made to determine the number of man-hours that would have been required to treat all stations either with the 1-gallon-per-acre oil

formula or with the dusts, and it was found that a 52-percent saving in man-hours would have been effected if the DDT-oil mists had been used throughout.

The control unit's man-hour total from January 1 to October 19, 1945 was 31,480. Of this number, only 1,966 man-hours were spent in actual larviciding operations, which represents only 6.25 percent of the total man-hours. One station was treated that had an area of approximately 3½ acres. Here, the average man-hours per acre for 11 treatments with the 1-gallon-per-acre oil formula was 1.3 while the average dosage was 0.106 pound DDT per acre. A total of 45 treatments were made on other stations, which ranged from 600 to 63,000 square feet in area. The average number of man-hours per acre for these was 2.66 and the dosage 0.197 (ranging from 0.05 to 0.4) pound of DDT per acre. This indicates that the greatest saving is obtained in the larger plots to be treated.

The cost of materials varied during the season, but late prices were as follows: technical DDT, $0.45 a pound; Neocid, a 10-percent DDT concentrate, $0.31 a pound; paris green, $0.20 a pound; No. 2 fuel oil, $0.08 a gallon; lime and pyrophyllite, $10 per ton; B-1956, $3.80 a gallon. If these prices are used and the treatments are made at the recommended dosage, the cost per acre should be:

0.1 pound DDT in 1 gallon No. 2 fuel oil	$0. 15
0.1 pound DDT in pyrophyllite	. 36
1 pound paris green in lime	. 25

This indicates that the 1-gallon-per-acre oil formula with DDT is approximately 40 percent cheaper than the cheapest dust used.

The regions treated with the various larvicides were given the same care as regards to clearing and cleaning, and therefore should not show any difference in cost for maintenance. However, under recommended control practices, it is anticipated that very little clearing of aquatic or emergent vegetation will be necessary, due to the ability of DDT-oil mists to penetrate plant growth.

When the described work was initiated, insufficient data were available to indicate the lowest practical effective dosage of DDT applicable to routine larviciding. Nor were there sufficient data on the effects of such treatments on wildlife. At that time, the data available indicated that a dosage of 0.1 pound of DDT per acre was acceptable. Parallel tests were conducted on the effects of DDT on wildlife, and the results of this work showed that routine larviciding with DDT in oil at the rate of 0.1 pound per acre caused considerable damage to fish life. Although the present paper is based on the use of 0.1 pound per acre, it has been found that this dosage can be safely

reduced by one-half. Dosages of 0.05 pound of DDT per acre give a larval control comparable to the 0.1 pound previously used. At this dosage, it is not indicated that appreciable damage will result to wildlife from normal larviciding operations.

SUMMARY

These data show DDT to be a satisfactory routine anopheline larvicide used as a dust or in an oil-water emulsion at 15 gallons per acre, or when dispersed in a solution at the rate of 1 gallon per acre as an air-borne mist.

High initial toxicity to larvae is ordinarily obtained at an average rate of 0.1 pound DDT per acre whether in a dust, an oil-water emulsion, or in oil solution.

When compared to a 10-percent paris-green dust, a 1-percent DDT dust (both used at a rate of 10 pounds per acre) gives approximately the same control on large larvae and a slightly higher rate of reduction on small larvae.

Either the DDT-oil-water emulsion or the DDT-oil mist gives a higher degree of control of all instars considered separately than does either the paris-green or DDT dust.

Data from control-operation records show that approximately the same time is required to treat breeding areas of 10 feet or less in width, regardless of whether paris-green or DDT dust is used. The 1-gallon-per-acre DDT-oil formula gives a saving of 36 percent as compared with the DDT dust. Use of the DDT-oil-water emulsion requires more time than any other formula used. In breeding areas greater than 10 feet in width, a 52-percent saving was obtained over the paris-green or DDT dust by the use of the 1-gallon-per-acre DDT-oil-mist treatment.

DDT-oil mists used at the rate of 1 gallon per acre are more economical than DDT-oil-water emulsions used at 15 gallons per acre. However, they give essentially the same degree of larval control.

DDT may be successfully handled and applied by labor-grade personnel. Air-borne mechanically atomized mists containing DDT and dispersed from light-weight air-pressure sprayers are shown to be an improvement in larviciding technique.

REFERENCES

(1) Arnold, E. H.; Ferguson, F. F.; and Upholt, W. M.: The experimental use of DDT sprays as mosquito larvicides. Pub. Health Rep., Supplement No. 186, pp. 66–80 (1945).

(2) Simmons, S. W., and staff: Tests of the effectiveness of DDT in anopheline control. Pub. Health Rep., 60: 917–927 (Aug. 10, 1945).

DEATHS DURING WEEK ENDED DECEMBER 21, 1946

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Dec. 21, 1946	Corresponding week, 1945
Data for 93 large cities of the United States:		
Total deaths	9,378	10,458
Average for 3 prior years	10,821	
Total deaths, first 51 weeks of year	460,804	460,330
Deaths under 1 year of age	790	617
Average for 3 prior years	618	
Deaths under 1 year of age, first 51 weeks of year	34,215	30,971
Data from industrial insurance companies:		
Policies in force	67,304,021	67,225,173
Number of death claims	11,637	13,511
Death claims per 1,000 policies in force, annual rate	9.0	10.5
Death claims per 1,000 policies, first 51 weeks of year, annual rate	9.4	10.0

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED DECEMBER 28, 1946

Summary

A total of 103 cases of poliomyelitis was reported for the week, as compared with 137 last week and 50 for the 5-year (1941–45) median. Of 8 States reporting 5 or more cases currently, 5 showed increases, as follows (last week's figures in parentheses): Illinois 10 (7), Wisconsin 11 (3), Florida 9 (0), Mississippi 5 (4), and Washington 6 (3). For the 52 weeks of the year, a total of 25,233 cases has been reported, as compared with 13,734 and 19,272, respectively, for the 52-week periods of 1945 and 1944.

The reported incidence of influenza declined during the week. A total of 2,660 cases was reported, as compared with 3,338 last week, 52,947 for the corresponding week last year, and a 5-year median of 3,466. States reporting more than 100 cases are as follows (last week's figures in parentheses): Texas 1,159 (1,726), Virginia 487 (525), South Carolina 271 (510), Arizona 131 (163). Reported cases to date since July 27 total 32,975, as compared with 362,248 for the corresponding period last year and a 5-year median of 32,764.

Current and cumulative figures since the respective seasonal low dates are below the corresponding medians for diphtheria, infectious encephalitis, measles, meningococcus meningitis, scarlet fever, typhoid and paratyphoid fever, and endemic typhus fever. The total for whooping cough for the period since September is also below the median for that period, although the current figure is slightly above the median for the corresponding week. A total of 1,177 cases of tularemia has been reported during the 52 weeks of the year ended December 28, as compared with 818 the preceding year, and 5,337 cases of undulant fever have been reported as compared with 4,804 last year.

Deaths recorded in 93 large cities of the United States for the week totaled 9,380, as compared with 9,378 last week, 11,399 and 9,934, respectively, for the corresponding weeks of 1945 and 1944, and a 3-year (1943-45) average of 11,920. The total for the 52 weeks of the year is 470,184, as compared with 471,729 for the corresponding 52 weeks last year.

Telegraphic morbidity reports from State health officers for the week ended Dec. 28, 1946, and comparison with corresponding week of 1945 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1941–45	Week ended—		Median 1941–45	Week ended—		Median 1941–45	Week ended—		Median 1941–45
	Dec. 28, 1946	Dec. 29, 1945		Dec. 28, 1946	Dec. 29, 1945		Dec. 28, 1946	Dec. 29, 1945		Dec. 28, 1946	Dec. 29, 1945	
NEW ENGLAND												
Maine	1	2	0	2	3	-------	123	-------	23	0	0	0
New Hampshire	0	0	0	1	2	-------	5	1	1	0	0	0
Vermont	1	1	0	-------	44	7	168	-------	4	0	0	0
Massachusetts	20	8	4	-------	-------	-------	197	157	157	1	8	6
Rhode Island	0	1	1	-------	8	8	43	-------	3	0	0	0
Connecticut	1	4	0	8	13	11	88	11	20	0	2	2
MIDDLE ATLANTIC												
New York	19	7	11	[1] 5	[1] 71	[1] 15	211	499	499	6	13	19
New Jersey	5	8	3	3	163	21	55	26	38	2	10	10
Pennsylvania	15	8	14	6	22	6	513	854	516	6	10	10
EAST NORTH CENTRAL												
Ohio	10	44	7	8	123	14	167	14	42	4	8	7
Indiana	16	9	9	3	469	37	15	10	25	1	3	4
Illinois	10	7	8	3	56	24	9	303	84	2	14	14
Michigan [2]	7	19	11	1	5	5	30	174	99	1	5	5
Wisconsin	1	4	3	15	1,034	45	57	44	172	1	0	2
WEST NORTH CENTRAL												
Minnesota	4	4	4	-------	2	1	6	3	71	0	1	1
Iowa	6	2	2	-------	388	1	4	8	83	0	3	2
Missouri	6	5	5	1	52	7	4	55	18	1	4	6
North Dakota	2	0	2	16	679	17	1	-------	3	0	0	0
South Dakota	0	2	2	-------	2	1	2	3	3	0	1	0
Nebraska	1	0	1	28	144	5	3	5	5	1	0	0
Kansas	3	7	5	17	2,586	10	6	40	40	1	1	1
SOUTH ATLANTIC												
Delaware	0	0	0	-------	-------	-------	1	2	4	0	0	0
Maryland [2]	7	11	9	2	105	5	10	11	11	1	0	2
District of Columbia	1	0	0	1	45	4	29	1	1	0	1	1
Virginia	6	7	10	487	5,907	432	41	29	47	0	2	6
West Virginia	3	15	2	45	2,302	18	63	6	6	1	6	0
North Carolina	4	20	14	-------	-------	7	48	17	17	1	4	4
South Carolina	1	9	9	271	3,243	674	24	36	36	1	0	1
Georgia	4	8	5	15	497	65	83	14	14	1	6	2
Florida	15	3	5	14	11	11	11	4	4	2	5	1
EAST SOUTH CENTRAL												
Kentucky	2	8	6	-------	3,071	25	-------	167	32	1	3	3
Tennessee	10	6	6	25	443	61	3	23	66	4	7	5
Alabama	8	12	12	91	1,218	194	18	3	4	1	6	8
Mississippi [2]	22	6	7	-------	-------	-------	-------	-------	-------	1	4	3
WEST SOUTH CENTRAL												
Arkansas	10	8	8	55	1,924	126	4	7	22	0	1	3
Louisiana	1	13	8	43	7,225	10	-------	5	5	0	2	2
Oklahoma	8	2	8	85	1,176	120	3	7	7	2	1	1
Texas	19	33	50	1,159	10,660	2,121	42	50	66	4	18	4
MOUNTAIN												
Montana	2	0	1	10	472	15	55	2	41	0	0	1
Idaho	1	2	1	14	1,151	2	3	105	4	0	0	0
Wyoming	1	1	0	27	3	18	4	15	8	0	1	1
Colorado	13	5	5	31	278	69	10	25	82	0	1	1
New Mexico	8	2	1	1	3	1	11	6	-------	0	1	1
Arizona	3	3	2	131	1,885	157	39	-------	10	0	0	0
Utah [2]	1	0	0	-------	369	55	4	27	27	0	2	1
Nevada	0	0	0	-------	1	-------	-------	7	3	0	0	0
PACIFIC												
Washington	1	7	4	-------	-------	1	6	272	43	1	3	3
Oregon	0	7	4	22	307	18	20	29	55	1	1	2
California	21	21	24	13	285	60	17	146	168	4	14	14
Total	300	341	331	2,660	52,947	3,466	2,251	2,723	4,212	58	162	187
52 weeks	16,193	18,541	15,559	223,172	431,146	421,155	662,972	128,683	602,085	5,631	7,999	7,999
Seasonal low week [3]	(27th) July 5–11			(30th) July 26–Aug. 1			(35th) Aug. 30–Sept. 5			(37th) Sept. 13–19		
Total since low	7,565	11,644	9,072	32,975	362,248	32,764	22,887	26,124	36,455	971	1,504	1,504

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Dates between which the approximate low week ends. The specific date will vary from year to year.

Telegraphic morbidity reports from State health officers for the week ended Dec. 28, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever [4]		
	Week ended—		Median 1941–45	Week ended		Median 1941–45	Week ended—		Median 1941–45	Week ended—		Median 1941–45
	Dec. 28, 1946	Dec. 29, 1945		Dec. 28, 1946	Dec. 29, 1945		Dec. 28, 1946	Dec. 29, 1945		Dec. 28, 1946	Dec. 29, 1945	
NEW ENGLAND												
Maine	0	0	0	13	28	22	0	0	0	0	1	1
New Hampshire	0	0	0	4	2	9	0	0	0	0	0	0
Vermont	1	0	0	9	3	6	0	0	0	0	0	0
Massachusetts	3	1	1	144	114	246	0	0	0	2	2	2
Rhode Island	1	0	0	7	5	9	0	0	0	0	0	0
Connecticut	1	1	0	28	28	29	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York	8	3	3	220	233	285	0	0	0	1	2	2
New Jersey	2	1	1	56	56	84	0	0	0	1	2	1
Pennsylvania	1	2	1	90	197	197	0	0	0	0	4	3
EAST NORTH CENTRAL												
Ohio	0	1	1	249	221	225	0	0	0	1	13	5
Indiana	0	1	0	92	54	78	0	1	1	0	1	0
Illinois	10	5	5	101	117	160	0	0	0	4	0	1
Michigan [2]	4	5	1	134	147	160	0	0	0	0	0	2
Wisconsin	11	25	3	73	99	112	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	3	3	0	35	38	62	0	0	0	0	0	0
Iowa	0	0	0	20	26	50	0	0	0	0	0	0
Missouri	7	3	1	34	41	57	0	1	0	1	1	0
North Dakota	1	0	0	2	12	11	0	0	0	0	0	0
South Dakota	0	0	0	4	9	22	0	0	0	0	0	0
Nebraska	0	0	0	30	18	24	0	1	0	0	0	0
Kansas	3	1	1	40	47	62	0	0	0	0	1	0
SOUTH ATLANTIC												
Delaware	0	0	0	10	4	4	0	0	0	0	0	0
Maryland [2]	0	0	0	21	23	53	0	0	0	1	0	2
District of Columbia	0	0	0	10	9	26	0	0	0	0	0	1
Virginia	2	0	0	33	68	50	0	0	0	0	2	2
West Virginia	0	0	0	19	24	28	0	0	0	0	0	0
North Carolina	1	0	0	13	20	48	0	0	0	0	1	0
South Carolina	0	2	1	0	14	10	0	0	0	0	1	1
Georgia	0	4	0	6	14	17	0	0	0	0	0	2
Florida	9	2	0	7	10	10	0	0	0	3	2	1
EAST SOUTH CENTRAL												
Kentucky	0	0	1	4	49	49	0	0	0	2	0	1
Tennessee	2	0	0	40	20	21	0	0	0	6	6	1
Alabama	2	3	0	12	8	11	0	0	0	1	5	2
Mississippi [2]	5	0	1	8	6	7	0	1	0	0	0	0
WEST SOUTH CENTRAL												
Arkansas	3	1	0	3	7	8	0	1	1	0	2	2
Louisiana	0	0	0	1	25	11	0	0	0	1	3	3
Oklahoma	1	0	0	9	16	21	1	1	1	2	2	1
Texas	0	2	2	20	74	57	0	0	0	3	7	6
MOUNTAIN												
Montana	0	3	0	3	15	15	0	0	0	0	0	0
Idaho	0	0	0	8	6	17	0	0	0	2	0	0
Wyoming	0	0	0	20	4	4	0	0	0	0	0	0
Colorado	1	1	1	31	47	41	0	0	0	0	0	0
New Mexico	0	0	0	6	11	11	0	0	0	0	3	3
Arizona	0	0	0	11	8	9	0	0	0	0	0	0
Utah [2]	1	1	1	21	15	41	0	0	0	0	0	0
Nevada	0	0	0	0	0	0	0	0	0	0	0	
PACIFIC												
Washington	6	7	1	81	40	42	0	0	0	3	0	0
Oregon	0	2	1	15	30	26	0	0	0	0	0	1
California	14	6	6	72	149	149	0	0	0	2	0	1
Total	103	86	50	1,873	2,211	2,868	1	6	6	36	61	61
52 weeks	*25,233	13,734	12,401	112,981	172,389	140,475	333	349	733	*4,008	4,875	5,546
Seasonal low week [3]	(11th) Mar. 15–21			(32nd) Aug. 9–15			(35th) Aug. 30–Sept. 5			(11th) Mar. 15–21		
Total since low	24,767	13,337	12,099	26,686	38,571	38,571	54	76	117	3,528	4,251	4,961

[2] Period ended earlier than Saturday.

[3] Dates between which the approximate low week ends. The specific date will vary from year to year.

[4] Including paratyphoid fever reported separately, as follows: Massachusetts (salmonella infection (1); New Jersey 1; Florida 1.

*Delayed reports included in cumulative total only: poliomyelitis Arkansas 1 case, Wisconsin 37 cases; typhoid fever Arkansas 1 case.

Telegraphic morbidity reports from State health officers for the week ended Dec. 28, 1946, and comparison with corresponding week of 1945 and 5-year median—Con.

Division and State	Whooping cough: Week ended— Dec. 28, 1946	Whooping cough: Week ended— Dec. 29, 1945	Whooping cough: Median 1941–45	Week ended Dec. 28, 1946: Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis, infectious	Rocky Mt. spotted fever	Tularemia	Typhus fever, endemic	Undulant fever
NEW ENGLAND											
Maine	3	9	19								
New Hampshire	1	7	7								3
Vermont	16	52	34								3
Massachusetts	141	93	94								
Rhode Island	9	17	13		1						
Connecticut	11	17	38								1
MIDDLE ATLANTIC											
New York	158	213	213	9	4		1				7
New Jersey	105	97	97	2							
Pennsylvania	116	86	139	1			1				5
EAST NORTH CENTRAL											
Ohio	49	55	87	1					3		1
Indiana	32	18	15				1		11		5
Illinois	67	51	51	3			1		8		24
Michigan [3]	118	64	70	1							2
Wisconsin	177	36	67								1
WEST NORTH CENTRAL											
Minnesota	2		16	2							
Iowa	10		13								6
Missouri	11	3	13			1			10		
North Dakota			2								
South Dakota	4	6	6								
Nebraska	4	1	2								
Kansas	6	7	28						1		1
SOUTH ATLANTIC											
Delaware	6	1	1								
Maryland [3]	39	7	28						2		3
District of Columbia	4	8	8						2		
Virginia	35	34	34			41			6		
West Virginia	23	5	10								
North Carolina	12	20	62						1	1	
South Carolina	14	44	33								
Georgia	19		2		2				1	5	1
Florida	48	2	6							4	1
EAST SOUTH CENTRAL											
Kentucky	23	11	11						1		
Tennessee	9	24	24			1	2		9	2	1
Alabama	97	5	14							3	
Mississippi [3]										1	2
WEST SOUTH CENTRAL											
Arkansas	11	1	17								4
Louisiana	2								1		1
Oklahoma	9	3	3	3					4		
Texas	130	83	95	8	272	71		1	1	7	5
MOUNTAIN											
Montana	3	1	3								1
Idaho	3	42	1								
Wyoming	10	1	3								
Colorado	7	12	12								
New Mexico	10		2		2	2					
Arizona	14		7			20					1
Utah [3]	1	6	11						1		1
Nevada		5									
PACIFIC											
Washington	7	25	25								
Oregon	5	8	8								
California	66	30	121	3	8		2		1	1	3
Total	1,647	1,210	1,570	33	289	136	8	1	63	24	83
Same week, 1945	1,210			41	266	74	5	0	29	44	34
Average, 1943–45	1,356			36	406	134	9	[5] 0	31	[5] 58	
52 weeks: 1946	100,212			2,427	16,712	6,487	617	572	1,177	3,351	5,337
1945	123,554			1,958	24,700	10,495	620	467	818	5,167	4,804
Average, 1943–45	131,860		[5] 176,415	1,995	22,638	9,085	649	[5] 455	782	[5] 4,533	

[3] Period ended earlier than Saturday.
[5] 5-year median, 1941–45.

Anthrax: New York 1 case.
Leprosy: New York 1 case.

WEEKLY REPORTS FROM CITIES[1]

City reports for week ended Dec. 21, 1946

This table lists the reports from 84 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table

Division, State, and city	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0	------	0	38	0	3	1	10	0	0	2
New Hampshire:												
Concord	0	0	------	0	------	0	4	0	0	0	0	------
Vermont:												
Barre	0	0	------	0	------	0	0	0	0	0	0	1
Massachusetts:												
Boston	18	0	------	0	18	1	4	1	16	0	0	38
Fall River	0	0	------	0	------	0	0	0	3	0	0	2
Springfield	2	0	------	0	1	0	0	0	5	0	0	5
Worcester	0	0	------	0	3	0	11	0	7	0	0	28
Rhode Island:												
Providence	1	0	------	0	15	0	5	0	14	0	0	20
Connecticut:												
Bridgeport	0	0	------	0	1	0	0	0	0	0	0	------
New Haven	0	0	------	0	44	0	0	0	0	0	0	1
MIDDLE ATLANTIC												
New York:												
Buffalo	3	0	------	0	1	0	5	0	7	0	0	6
New York	24	2	6	3	36	2	61	4	65	0	3	46
Rochester	0	0	------	1	1	0	4	0	8	0	0	1
Syracuse	0	0	------	1	------	0	3	0	8	0	0	27
New Jersey:												
Camden	0	0	------	0	1	1	1	0	0	0	0	3
Newark	0	0	2	0	2	0	3	0	10	0	0	21
Trenton	1	0	------	0	21	0	2	0	1	0	1	1
Pennsylvania:												
Philadelphia	5	0	5	1	6	1	15	1	22	0	1	31
Pittsburgh	1	0	------	0	284	1	7	0	17	0	0	3
Reading	1	0	------	0	------	0	0	0	1	0	0	3
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	2	0	------	0	------	0	5	0	13	0	0	7
Cleveland	0	0	1	0	82	2	5	1	29	0	0	10
Columbus	4	0	------	0	1	1	5	0	10	1	0	3
Indiana:												
Fort Wayne	2	0	------	0	3	0	2	0	0	0	0	------
Indianapolis	1	0	------	0	------	1	6	0	7	0	0	19
South Bend	0	0	------	0	------	0	0	0	4	0	0	------
Terre Haute	0	0	------	0	------	0	1	0	1	0	0	------
Illinois:												
Chicago	1	0	4	2	8	0	18	1	54	0	0	58
Michigan:												
Detroit	0	0	1	0	4	0	10	0	46	0	0	49
Flint	0	0	------	0	1	0	4	0	4	0	0	2
Grand Rapids	0	0	------	0	1	0	2	0	7	0	2	4
Wisconsin:												
Kenosha	0	0	------	0	------	0	0	0	2	0	0	------
Milwaukee	0	1	------	0	9	3	4	0	8	0	0	29
Racine	0	0	------	0	------	0	0	0	3	0	0	4
Superior	1	0	------	0	------	0	0	0	0	0	0	------
WEST NORTH CENTRAL												
Minnesota:												
Duluth	1	0	------	0	------	0	1	1	1	0	0	4
Minneapolis	3	0	------	0	1	0	5	0	9	0	0	2
Missouri:												
Kansas City	1	0	------	0	------	0	4	1	2	0	0	5
St. Joseph	0	0	------	0	------	0	0	0	0	0	0	6
St. Louis	2	0	2	0	5	0	8	1	10	0	0	5

[1] In some instances the figures include nonresident cases.

City reports for week ended Dec. 21, 1946—Continued

Division, State, and city	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
WEST NORTH CENTRAL—continued												
Nebraska:												
Omaha	0	0	------	0	1	0	2	0	1	0	0	------
Kansas:												
Topeka	1	0	------	0	------	0	0	0	0	0	0	0
Wichita	0	0	------	0	1	0	3	0	1	0	0	------
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0	------	0	------	0	1	0	3	0	0	2
Maryland:												
Baltimore	7	0	1	0	8	0	7	0	5	0	0	40
Cumberland	0	0	------	0	1	0	0	0	0	0	0	------
Frederick	0	0	------	0	------	0	0	0	0	0	0	------
District of Columbia:												
Washington	1	0	1	0	17	0	3	1	4	0	2	4
Virginia:												
Lynchburg	0	0	------	0	------	0	1	0	1	0	0	1
Richmond	2	0	------	0	30	1	1	0	5	0	0	------
Roanoke	0	0	------	0	------	0	0	0	3	0	0	------
West Virginia:												
Wheeling	0	0	------	0	------	0	0	0	0	0	0	2
North Carolina:												
Raleigh	0	0	------	0	------	0	2	0	0	0	0	3
Wilmington	0	0	------	0	------	0	2	0	0	0	0	------
Winston Salem	0	0	------	0	34	0	1	0	0	0	0	------
South Carolina:												
Charleston	0	0	23	0	------	0	0	0	1	0	0	------
Georgia:												
Atlanta	1	0	9	4	7	0	5	0	2	0	0	2
Brunswick	0	0	------	0	------	0	1	0	0	0	0	------
Savannah	0	0	------	1	13	0	2	0	0	0	0	------
Florida:												
Tampa	3	0	1	0	------	2	1	0	2	0	1	2
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	1	0	------	1	------	2	12	1	2	0	0	2
Nashville	3	0	------	0	------	1	0	0	1	0	0	------
Alabama:												
Birmingham	2	0	8	0	4	1	2	0	5	0	1	------
Mobile	0	0	17	1	5	0	1	0	0	0	0	------
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	------	0	2	0	0	0	1	0	0	------
Louisiana:												
New Orleans	4	0	2	3	5	0	6	1	3	0	0	------
Shreveport	0	0	------	0	------	0	3	0	0	0	0	------
Texas:												
Dallas	0	0	------	1	------	0	1	0	3	0	0	2
Galveston	2	0	------	0	------	0	0	0	0	0	0	------
Houston	0	0	------	0	------	0	3	1	2	0	0	------
San Antonio	3	0	------	0	------	0	8	0	0	0	0	1
MOUNTAIN												
Montana:												
Billings	0	0	------	0	------	0	1	0	0	0	0	------
Great Falls	0	0	------	0	------	0	0	0	1	0	0	------
Helena	0	0	------	0	1	0	0	0	0	0	0	------
Missoula	0	0	------	0	4	0	0	0	0	0	0	------
Colorado:												
Denver	9	0	4	0	2	0	8	0	14	0	0	3
Pueblo	2	0	------	0	------	0	0	0	1	0	0	------
Utah:												
Salt Lake City	3	0	------	0	1	0	4	0	3	0	0	------

City reports for week ended Dec. 21, 1946—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza: Cases	Influenza: Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
PACIFIC												
Washington.												
Seattle	0	0	------	0	4	1	2	0	5	0	0	4
Spokane	0	0	------	0	2	0	0	0	2	0	0	------
Tacoma	0	0	------	0	------	0	1	0	1	0	0	------
California:												
Los Angeles	0	0	4	0	6	1	4	8	19	0	0	10
Sacramento	1	0	1	1	2	0	3	0	2	0	0	1
San Francisco	0	0	1	0	3	0	2	0	11	0	0	------
Total	125	3	93	20	740	22	301	24	508	1	11	581
Corresponding week, 1945	95	------	1,740	80	808	------	496	------	582	0	8	425
Average 1941-45	79	------	1,501	[2] 139	[3] 995	------	[2] 674	------	888	0	10	837

[2] 3-year average, 1943-45.
[3] 5-year median, 1941-45.

Dysentery, amebic.—Cases: Buffalo 1; New York 8; Newark 1; Chicago 2; Spokane 1; Los Angeles 1.
Dysentery, bacillary.—Cases: Charleston, S. C., 2; Los Angeles 5; San Francisco 1.
Dysentery, unspecified.—Cases: San Antonio 8.
Leprosy.—Cases: New Orleans 1.
Rocky Mountain spotted fever.—Cases: Baltimore 1.
Tularemia.—Cases: St. Louis 4; Washington, D. C., 1.
Typhus fever, endemic.—Cases: Atlanta 1; Savannah 1; Mobile 1; New Orleans 1.

Rates (annual basis) per 100,000 population, by geographic groups, for the 84 cities in the preceding table (estimated population, 1943, 33,737,700)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza: Case rates	Influenza: Death rates	Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
New England	60.1	0.0	0.0	0.0	344	2.9	77.3	5.7	158	0.0	0.0	295
Middle Atlantic	16.2	0.9	6.0	2.8	163	2.3	46.7	2.8	64	0.0	2.3	66
East North Central	6.7	0.6	3.7	1.2	67	4.3	38.0	1.2	115	0.6	1.2	113
West North Central	18.0	0.0	4.5	0.0	18	0.0	51.8	6.8	54	0.0	0.0	50
South Atlantic	23.4	0.0	58.6	8.4	184	5.0	45.2	1.7	44	0.0	5.0	94
East South Central	35.4	0.0	147.5	11.8	53	23.6	88.5	5.9	47	0.0	5.9	12
West South Central	25.8	0.0	5.7	11.5	20	0.0	60.3	5.7	26	0.0	0.0	9
Mountain	115.6	0.0	33.0	0.0	66	0.0	107.4	0.0	157	0.0	0.0	25
Pacific	11.1	0.0	9.5	1.6	27	3.2	19.0	12.7	63	0.0	0.0	24
Total	19.4	0.5	14.4	3.1	115	3.4	46.6	3.7	79	0.2	1.7	82

TERRITORIES AND POSSESSIONS

Puerto Rico

Notifiable diseases—4 weeks ended November 30, 1946.—During the 4 weeks ended November 30, 1946, cases of certain notifiable diseases were reported in Puerto Rico as follows:

Disease	Cases	Disease	Cases
Chickenpox	3	Syphilis	130
Diphtheria	41	Tetanus	6
Dysentery, unspecified	5	Tetanus, infantile	1
Gonorrhea	128	Tuberculosis (all forms)	590
Influenza	167	Typhoid and paratyphoid fever	5
Malaria	566	Typhus fever (murine)	5
Measles	4	Whooping cough	155
Poliomyelitis	36		

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended December 7, 1946.—During the week ended December 7, 1946, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		29		160	405	41	62	99	174	970
Diphtheria		2		43	17	4	1	2		69
Dysentery:										
Amebic					5					5
Bacillary				1						1
Encephalitis, infectious					1					1
German measles				5	15			11	7	38
Influenza					3	2			1	6
Measles		573		137	81	67	378	173	120	1,525
Meningitis, meningococcus			1	1	1	1	3			7
Mumps		1		45	292	35	90	24	200	696
Poliomyelitis		2		7	8			1		18
Scarlet fever		8	6	86	114	6	2	3	17	242
Tuberculosis (all forms)		10	21	122	62	40	11	40	48	354
Typhoid and paratyphoid fever				3	1				2	6
Undulant fever				1						1
Venereal diseases:										
Gonorrhea		9	17	130	106	40	32	57	92	483
Syphilis		14	12	94	90	11	11	9	38	279
Other forms									4	4
Whooping cough		2	1	70	101	8	4	5	8	199

FINLAND

Notifiable diseases—October 1946.—During the month of October 1946, cases of certain notifiable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	9	Poliomyelitis	48
Diphtheria	1,262	Scarlet fever	190
Dysentery	16	Syphilis	551
Gonorrhea	1,805	Typhoid fever	44
Paratyphoid fever	436		

NEW ZEALAND

Notifiable diseases—4 weeks ended November 2, 1946.—During the 4 weeks ended November 2, 1946, certain notifiable diseases were reported in New Zealand as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Cerebrospinal meningitis	12		Poliomyelitis	1	
Diphtheria	75	1	Puerperal fever	8	
Dysentery:			Scarlet fever	106	
Amebic	1		Tetanus	2	
Bacillary	5		Trachoma	8	
Erysipelas	13		Tuberculosis (all forms)	218	80
Food poisoning	31	1	Typhoid fever	6	
Malaria	3		Undulant fever	2	

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-named diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday of each month.

Plague

Brazil—Minas Geraes State—Serro.—During the month of December 1946, 12 cases of plague were reported in Serro, Minas Geraes State, Brazil.

Manchuria—Harbin.—For the period July 1 to November 8, 1946, 264 cases of plague were reported in Harbin, Manchuria.

Smallpox

China—Hong Kong.—For the week ended December 14, 1946, 162 cases of smallpox were reported in Hong Kong, China.

Colombia.—For the month of November 1946, 165 cases of smallpox with 4 deaths were reported in Colombia. Departments reporting the highest incidence are: Narino, 86 cases; Huila, 27 cases, 2 deaths; Santander, 19 cases; Cundinamarca, 18 cases, 2 deaths.

Ecuador.—For the month of November 1946, 28 cases of smallpox with 2 deaths were reported in Ecuador, including 23 cases reported in Babahoya, Los Rios Province, Ecuador.

Typhus Fever

Colombia.—For the month of November 1946, 218 cases of typhus fever with 8 deaths were reported in Colombia. Departments reporting the highest incidence are: Narino, 68 cases, 4 deaths; Cundinamarca, 48 cases, 1 death; Santander, 27 cases; Caldas, 23 cases; Magdalena, 15 cases; Huila, 12 cases.

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

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It contains (1) current information regarding the prevalence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Public Health Reports

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Public Health Reports

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SERVICES AND VISITS IN A CHILDREN'S DENTAL CLINIC

By Isidore Altman, *Statistician, United States Public Health Service* [1]

This is the second paper presenting data on children's dental services provided by a philanthropic organization in a large urban center. The first report (*1*) was concerned with the description of a time study of routine treatment—the number of dentist minutes per filling, per extraction, and the like—as provided in the various clinics of the organization. The present paper is concerned with the volume of dental services required and received by the children who come to the largest of the clinics.

It is now widely agreed that the best approach to meeting the problems of dental health is through early and continued care of children's teeth (*2*, *3*); yetsu fficient data upon which to base general action appear to be lacking. Although there have been numerous surveys of dental conditions among children, few studies have dealt with the statistics of actual treatment under varying methods of furnishing care. It is hoped that this paper will provide material in that direction. Specifically, and as stated, it presents the experience of a privately financed dental clinic: the number of services and visits entailed in providing treatment, and the periodic increment in defects found. Also covered is the continuity in seeking treatment, as measured by the proportion of children who visit the clinic a sufficient number of times to receive all the treatment they need and the proportion who return periodically for reexamination and treatment.

THE CLINICS OF THE PHILADELPHIA MOUTH HYGIENE ASSOCIATION

The information was collected from the case records of the Philadelphia Mouth Hygiene Association, a social agency which operates

[1] From the Division of Public Health Methods.

six dental clinics [2] strategically located throughout the city, for children in low economic circumstance. The clinics vary in size from two chairs to six, in accordance with the demand in each area served. They are staffed largely by dentists employed on a full-time salaried basis, and by hygienist-interns who usually perform the prophylaxes and manage the administrative details of the clinics. Experienced hygienists are employed in the two largest clinics to supervise and instruct the hygienist-interns. The children who come to the clinics pay 50 cents per visit for routine treatment, and comparably low fees are charged for prosthetic appliances and orthodontic services.

The first visit of the patient is customarily devoted to a prophylaxis by the hygienist. At this time, the latter makes an oral examination, charting previous fillings and extractions and indicating the necessary treatment to be given. The examination results are subject to change and modification by the dentists when they do the operative work. If the hygienist finds no cavities or teeth to be extracted, her findings must be verified by a dentist. Examinations are made with explorer and mirror.

COMPOSITION OF THE GROUP OF CHILDREN STUDIED

For this statistical study, the subjects chosen were all the children who came for the first time to the Central City Clinic of the association in 1942 or 1943. There were 1,402 new cases in these 2 years, exclusive of emergency patients and patients who proved to be ineligible. Of this number, 1,169 were tabulated; the remaining 233 could not be traced or had been transferred to other clinics, either because the family had moved or the clinics were more easily accessible. A sample of these transfers showed that as a group they did not differ in characteristics from the nontransfers.

The distribution of the children by color, sex, and age (at first visit) is shown in table 1. Since these were new patients and since

TABLE 1.—*Number of children, by color, sex, and age groups, who first came to Central City Clinic of the Philadelphia Mouth Hygiene Association in 1942–43*

Color and sex	Average age (years)	Age in years											
		All ages	5 or less	6	7	8	9	10	11	12	13	14	15	16 and over
All children	10.8	1,169	102	68	82	75	109	83	97	96	114	132	126	85
White:														
Boys	10.4	356	31	29	29	26	34	32	31	30	27	36	27	24
Girls	9.9	444	41	24	26	28	41	35	34	40	44	43	63	25
Other: [1]														
Boys	11.3	154	15	4	10	11	10	6	15	12	16	25	18	12
Girls	11.2	215	15	11	17	10	24	10	17	14	27	28	18	24

[1] Includes six children of Filipino origin.

[2] The number has varied. Present plans (Nov. 1, 1946) are to add two new clinics. The association's largest clinic, from which these materials were obtained, has been closed awaiting the completion of new quarters.

referrals come frequently from school nurses, it might have been expected that the group would be weighted with 6- and 7-year-olds—the first and second graders. Instead, there is a fairly even distribution by age, with the mean age at a little less than 11 years. This age distribution is quite similar to that of all American school children (1940 census) and the average age is the same (table 2). In this respect at least, the group can be accepted as representative of the general population, within the ages shown in the table.

TABLE 2.—*Percentage distribution of school children in the United States and attending the Central City Clinic of the Philadelphia Mouth Hygiene Association*

Age group (years)	All children		White children	
	United States [1]	Dental clinic	United States [1]	Dental clinic
5–6	15.6	[2] 14.5	15.3	[2] 15.6
7–9	22.7	22.7	22.6	23.0
10–13	33.1	33.4	33.0	34.1
14–15	16.1	22.1	16.3	21.2
16–17	12.5	[3] 7.3	12.8	[3] 6.1
Total	100.0	100.0	100.0	100.0
Average age (years)	10.9	10.8	10.9	10.1

[1] Sixteenth Census of the United States, 1940: Population, Second Series, Characteristics of the Population, United States Summary, table 11. For the 5- to 6-year old group, the total number of children were used, whether attending school or not.
[2] Includes a small number of children under 5 years.
[3] Includes a small number of 18-year-olds.

Negro children were, on the average, a year older than the white children when they first came to the clinic. What significance there is in the total number of white and Negro children cannot be measured since the extent of coverage by the clinics of the Philadelphia Mouth Hygiene Association was not explored. For the most part, the data shown in the body of the text combine white and Negro children. There is included as an appendix a corresponding set of tables for white children only.

It should be pointed out that the children are not necessarily a representative group from the viewpoint of dental need or treatment required. Attendance at the clinic is voluntary; hence, some factor of selection is present, both in the character of these children and in their caries susceptibility. The findings given here are to be interpreted in that light.

PREVIOUS DENTAL TREATMENT

Dental treatment previously received is marked on the clinical chart and this provides some index of the number of children who had been to a dentist in the past. However, prior care of deciduous teeth was not tabulated in this study since there was no way of telling

whether deciduous teeth which were indicated as missing had been extracted by a dentist or had ever received any other attention.

In the entire group of 1,169 children, 526, or 45 percent, had had some previous dental work on their permanent teeth—13 percent had had permanent teeth filled and extracted, 21 percent fillings only, and 11 percent extractions only. An additional number may have been to dentists who found nothing wrong with their teeth. More girls than boys had been to the dentist, 48 percent as against 42 percent; more white children than Negro children, 50 percent as against 34 percent.

COMPLETIONS

In planning programs of children's dental care, in which attendance is voluntary, a serious problem arises regarding the failure of many children to return for all necessary treatment during a series of treatments, or to come back periodically for check-up and maintenance care. Such defections, when they are extensive, have an appreciable effect upon the volume of services which the program will provide and upon the effectiveness of treatment. They indicate that the program must include a plan of education and of follow-up that will reduce failures to a minimum.

Table 3 describes the status of the 1,169 records under study with

TABLE 3.—*Treatment history of 1,169 children who first came to the clinic of the Philadelphia Mouth Hygiene Association in 1942–43, by color and sex*

Treatment history	Number of children					Percentage of children				
	All	White boys	White girls	Other boys	Other girls	All	White boys	White girls	Other boys	Other girls
Initial treatment complete:										
Treatment up to date	139	44	63	16	16	11.9	12.4	14.2	10.4	7.4
Response after second recall but treatment not up to date	19	7	8	1	3	1.6	2.0	1.8	.7	1.4
No response after completed second recall	25	9	10	3	3	2.1	2.5	2.2	1.9	1.4
Second recall incomplete	10	4	2	3	1	.9	1.1	.5	1.9	.5
No response after completed first recall	93	40	39	4	10	8.0	11.2	8.8	2.6	4.6
First recall incomplete	50	17	17	9	7	4.3	4.8	3.8	5.9	3.3
No response to first recall	290	86	119	32	53	24.8	24.1	26.8	20.8	24.7
Total	626	207	258	68	93	53.6	58.1	58.1	44.2	43.3
Initial treatment incomplete:										
No further response	497	137	177	80	103	42.5	38.5	39.9	51.9	47.9
Child returned at later date	46	12	9	6	19	3.9	3.4	2.0	3.9	8.8
Total	543	149	186	86	122	46.4	41.9	41.9	55.8	56.7
All histories	1,169	356	444	154	215	100.0	100.0	100.0	100.0	100.0

respect to completion of the initial series and of succeeding recalls, the term "recall" being applied to all series following the initial one. The data are arranged in order of currency of treatment, beginning with the children whose dental care was considered to be up to date;

that is, they were, as of November 1, 1945, coming to the clinic or had completed their most recent recall within 6 months of this date. Two main divisions have been made on the basis of whether or not the child completed the initial series of treatments. As the table and figure 1 show, 46 percent of the original group failed to receive all the necessary initial treatments. About a fifth of these paid only a single visit to the clinic.

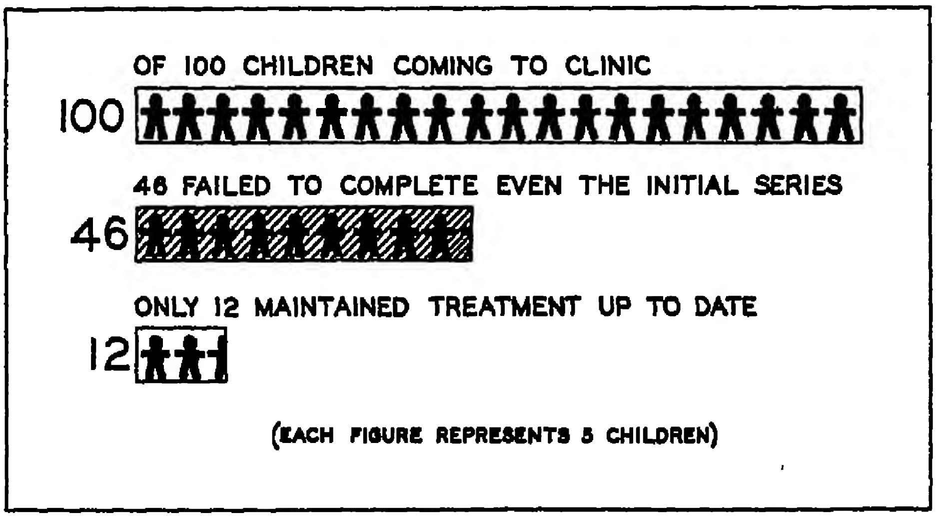

FIGURE 1.—Completion experience of patients. Philadelphia Mouth Hygiene Association.

Twenty-five percent carried their initial series through to completion but failed to return for treatment when recalled 6 months afterward. Another 17 percent had come back when first recalled but had dropped out since. Twelve percent of the children were up to date in their dental care (fig. 1).

There are color and age differences with regard to completions, but no differences to speak of in this respect between the sexes. A statistically significant difference occurs between white and Negro children; 58 percent of the former completed the initial series of treatments as compared with 44 percent of the latter. This difference shows no association with the volume of work required as shown by the original examinations of the two groups. The average number of extractions and fillings needed, both deciduous and permanent, was the same for each group.

Examination of the status of the case records according to age of the children reveals two findings that may be important. The first is that a marked difference exists between older and younger children in the proportion with current records. The extent of the difference is shown in the table below. The 15- and 16-year-olds have been eliminated because some of them may have left school since 1942 or 1943 and become ineligible for continued treatment.

Record history	Percentage of children in age group			
	White children		Other children	
	Under 10 years	10–14 years	Under 10 years	10–14 years
Treatment up to date	19.4	12.5	18.9	4.7
Initial series incomplete	37.5	40.6	51.2	58.8

Among white children, only 12 percent of the children 10 years of age and over were up to date in treatment, in contrast with 19 percent of the children under 10. Among the other children, 5 percent were up to date in the older group as compared with 19 percent in the younger.

The second finding is that the failure by the older group to receive all necessary treatment begins with the initial series of treatments. For, as the lower line of the above table shows, the percentage in the older group that failed to receive all treatment is greater than that in the younger. The differences, however, are not great.

SERVICES RECEIVED ON INITIAL SERIES BY CHILDREN WHO COMPLETED THIS SERIES OF VISITS

The routine services received by the 626 children who completed the initial series of treatments, and the number of visits in which these services were provided are summarized in table 4.

TABLE 4.—*Services and visits on initial series of treatments for 626 children who completed this series. Philadelphia Mouth Hygiene Association*

Service	Children receiving specified service		Number of teeth		Number of visits		
	Number	Percentage	Per child in group	Per child treated	Per child in group	Per child treated	Per tooth treated
Prophylaxis	565	90.3			0.9	1.0	
Fillings:							
Deciduous teeth	234	37.4	1.1	3.0	1.1	2.9	0.98
Permanent teeth	506	80.8	4.2	5.1	4.9	6.1	1.18
Extractions:							
Deciduous teeth	217	34.7	.9	2.5	.7	2.0	.79
Permanent teeth	230	36.7	.7	1.9	.7	1.9	.98
Polishing	452	72.2			.7	1.8	
X-ray	65	10.4					
Total services and visits	626	100.0	6.9		[2] 9.1	[2] 9.1	

[1] Per child who had one or more teeth filled.
[2] Includes a small number of visits for zinc oxide and eugenol treatment and treatment with silver nitrate.

Services.—Services are only briefly discussed because the time over which dental decay accrued in these children is not known, nor can the factor of selection previously mentioned be accounted for.

As the table shows, these children, the first time they visited this clinic, had an average of 5.3 teeth requiring fillings, both deciduous and permanent, and 1.6 teeth indicated for extraction. Of the entire group of 626 children, only 26 had no cavities to be filled. Four-fifths of the children had cavities in the permanent teeth, with an average of more than five teeth per child affected. A third required the extraction of a permanent tooth, but among these children 1.9 teeth were extracted per child. A small number of additional extractions which had to be done under gas anesthesia were referred to hospital outpatient departments.

A prophylaxis at the beginning of a series and a polishing at the last visit, when there had been fillings, were fairly routine. There were a few cases in which the only missing item of treatment was the polishing; these cases were still defined as completions. X-rays were taken when the dentist considered them necessary—in 10 percent of the cases who completed the initial series of treatments.

Visits.—The data on visits are considered to be among the most important of these findings. Such data are fundamental in planning dental programs, for they provide a good part of the information needed to determine dental-manpower requirements to meet children's needs.

Charges in this clinic, it was pointed out earlier, are made on a visit basis. In general, an operation such as a filling or an extraction constituted a visit, although the deviations from unity in the last column of table 4 indicate that the dentist found it expedient to vary somewhat the work done per visit. For example, the ratio of 0.79 visit per deciduous tooth extracted shows that two or more deciduous teeth were quite frequently extracted at the same time. Similarly, the ratio of 1.18 visits per filling of a permanent tooth is evidence that it frequently took more than one visit to fill a permanent tooth. One cavity or surface may have been taken care of at a time or the filling completed in two stages.

A prophylactic treatment per series of treatments is accepted practice. One visit ordinarily sufficed, but a few children required more than one visit to get their teeth satisfactorily cleaned; as a result, the number of visits per child for this purpose was 1.02.

To meet the needs indicated for this group took an average of nine visits. Eighteen children of the 626 required but one visit to the clinic for a prophylaxis, 21 required 2 visits, and 25 came 3 times. At the other extreme, there were 16 children for whom 20 or more visits were recorded, including 2 who made 31 visits.

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SERVICES RECEIVED BY CHILDREN WHO FAILED TO COMPLETE THE INITIAL SERIES

Data for the children who failed to return for all the services they needed are summarized in table 5. Comparison of this group with

TABLE 5.—*Services and visits on initial series of treatments for 543 children who failed to complete this series. Philadelphia Mouth Hygiene Association*

Service	Number of children	Percentage of children	Number of teeth: Per child in group	Number of teeth: Per child needing specified service	Number of visits: Per child in group	Number of visits: Per child needing specified service	Number of visits: Per tooth treated
Prophylaxis	508	93.6			1.0	1.1	
Fillings:							
Deciduous indicated	182	33.5	1.3	3.8			
Deciduous filled	72	13.3	.3	2.1	.3	2.1	.99
Permanent indicated	492	90.6	5.7	6.3			
Permanent filled	291	53.6	1.6	3.0	1.9	3.5	1.17
Extractions:							
Deciduous indicated	195	35.9	1.1	3.1			
Deciduous extracted	132	24.3	.6	2.5	.4	1.8	.71
Permanent indicated	267	49.2	1.3	2.6			
Permanent extracted	192	35.4	.7	1.9	.6	1.8	.97
Total services and visits	543	100.0	[1] 9.4		[2] 4.3	[2] 4.3	

[1] Indicated for filling or extraction.
[2] Includes a small number of visits for zinc oxide and eugenol treatment.

those children who completed their treatments (table 4) shows that the former, who were on the average a year older, had considerably more work to be done than the latter. The differences may be seen in the following tabulation and in figure 2.

Indicated treatment per child in group	Initial series: Completed	Initial series: Not completed
	Number of teeth	
Fillings:		
Deciduous teeth	1.1	1.3
Permanent teeth	4.2	5.7
Extractions:		
Deciduous teeth	.9	1.1
Permanent teeth	.7	1.3

The total number of visits these services would require, including visits for prophylaxis and polishing, is approximately 12. The average number of visits actually made was 4.3; that is to say, a little over a third of all the operations indicated were completed. In relation to work needed, more extractions were done than fillings (fig. 2), largely because it is the practice in these clinics to attend to the most

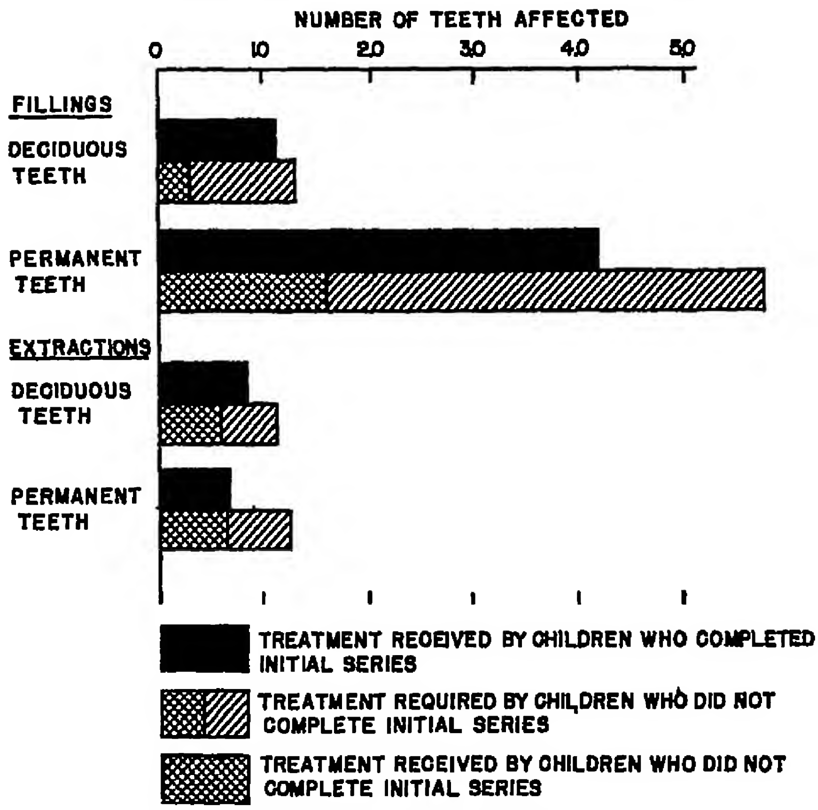

FIGURE 2.—Care required on initial series of treatments: Comparison of children who completed this series with those who did not. Philadelphia Mouth Hygiene Association.

urgent needs first. Often, it is an emergency extraction that introduces parent and child to the clinic.

The number of visits per service for these children, as shown in the last column of table 5, is remarkably similar to that for the group completing the initial series (table 4). As will be shown later (page 126), the ratio of visits to services was also very much the same on the subsequent recalls of these children. Thus, visits per type of service would seem to afford a constant or guide that is applicable in estimating dental-treatment facilities.

SERVICES RECEIVED ON FIRST RECALL

Patients of the clinic are recalled for examination and further treatment 6 months from the completion of the preceding series. Reference to table 3 will show that of the 626 children who completed the initial course of treatment, 336 responded to the recall notice (although not all the children responded promptly). Fifty failed to complete all treatment on first recall, but because of their small number these children have been included in the two tables for this section. The effect of their discontinuance can be gathered from the differences between treatment indicated and received.

Interval between initial series and first recall.—The average interval between completion of initial treatment and return for first recall was 7.2 months. Seventy percent of the group returned in 5 to 7 months, and all but 6 percent returned within a year. The services indicated for the group on first recall and the services received by them are

shown in table 6. The table is based on data for 329 children, since for various reasons the records of 7 children were not completely tabulated.

TABLE 6.—*Services and visits on first recall for 329 children. Philadelphia Mouth Hygiene Association*

Service	Number of children	Percentage of children	Number of teeth		Number of visits		
			Per child in group	Per child needing specified service	Per child in group	Per child needing specified service	Per tooth treated
Prophylaxis	318	96.7			1.0	1.0	
Fillings:							
Deciduous indicated	91	27.7	0.6	2.0			
Deciduous filled	79	24.0	.5	2.1	.5	2.0	0.98
Permanent indicated	245	74.5	2.4	3.3			
Permanent filled	222	67.5	1.9	2.8	2.0	3.0	1.09
Extractions:							
Deciduous indicated	69	21.0	.4	1.8			
Deciduous extracted	59	17.9	.3	1.8	.3	1.4	.81
Permanent indicated	26	7.9	.1	1.3			
Permanent extracted	26	7.9	.1	1.3	.1	1.3	1.03
Total services and visits	329	100.0	[1] 3.5		[2] 4.3	[2] 4.3	

[1] Indicated for filling or extraction.
[2] Includes visits for polishing and a small number of visits for zinc oxide and eugenol treatment and treatment with silver nitrate.

Services.—It is worth emphasizing that at the time these children completed the initial series they presumably required no further dental services. The data in table 6, then, represent the need that accrued over a period of 7 months on the average.

A fourth of the children were found to need fillings in one or more deciduous teeth and three-fourths to need fillings in the permanent teeth. One in five required extraction of deciduous teeth, and extraction of permanent teeth was indicated for about one in twelve. As for the number of teeth affected, the deciduous and permanent teeth combined amounted to three teeth per child to be filled and 0.5 tooth to be extracted.

Some appreciation of the significance of these increments is gained by comparing this group of children with those who did not return for the first recall. On the original series, the children who did not return required 7.1 fillings (teeth) and extractions, whereas for those who did return the figure was 6.6. The former required more services on the permanent teeth, but they were a year older on the average. This similarity between the two groups indicates that caries susceptibility was not a factor in the selection of the children who returned for first recall. Thus, the findings as to increment may have some application beyond these children.

The data for the children who responded to this recall are affected by their age distribution, for these are the years when the deciduous

teeth are lost and the permanent teeth acquired. The care needed by each age group, in 3-year intervals, is shown in table 7. The picture is

TABLE 7.—*Fillings and extractions indicated on first recall, by age group. Philadelphia Mouth Hygiene Association*

Age (in years)	Number of children	Per child in age group			
		Deciduous fillings (teeth)	Permanent fillings (teeth)	Deciduous extractions	Permanent extractions
6 or less	42	2.0	0.4	0.6	----------
7–9	81	1.1	2.0	.8	(1)
10–12	85	.2	2.7	.3	0.1
13–15	85	----------	3.6	(1)	.2
16 and over	36	----------	2.5	----------	.1
All children	329	.6	2.4	.4	.1

[1] Less than 0.05.

very much what one would expect. The tendency is to fill the deciduous teeth in the earliest years, when they are needed, and to extract them later on when they are ready for replacement by the permanent teeth. Permanent teeth required an increasing amount of attention until the age of 14 or 15 when, in this group at least, there was some tapering off in the number of teeth with cavities to be filled. The rate of extraction of permanent teeth after the age of 9 was fairly constant.

SERVICES RECEIVED ON SECOND RECALL

Data are presented in table 8 for 173 children [3] who returned for the second recall. The average time between the end of the first recall

TABLE 8.—*Services and visits on second recall for 173 children. Philadelphia Mouth Hygiene Association*

Service	Number of children	Percentage of children	Number of teeth		Number of visits		
			Per child in group	Per child needing specified service	Per child in group	Per child needing specified service	Per tooth treated
Prophylaxis	160	92.5	----------	----------	0.9	1.0	----------
Fillings:							
Deciduous indicated	43	24.9	0.5	2.0	----------	----------	----------
Deciduous filled	40	23.1	.4	1.9	.4	1.8	0.96
Permanent indicated	113	65.3	2.0	3.0	----------	----------	----------
Permanent filled	109	63.0	1.7	2.7	1.8	2.8	1.04
Extractions:							
Deciduous indicated	27	15.6	.3	1.9	----------	----------	----------
Deciduous extracted	24	13.9	.2	1.7	.2	1.4	.83
Permanent indicated	9	5.2	.1	1.6	----------	----------	----------
Permanent extracted	9	5.2	.1	1.4	.1	1.3	.92
Total services and visits	173	100.0	[1] 2.9	----------	[2] 3.8	[2] 3.8	----------

[1] Indicated for filling or extraction.
[2] Includes visits for polishing and a small number of visits for zinc oxide and eugenol treatment.

[3] According to table 2, there should be 195 children in this group, but the second recall records of 22 children were not tabulated; 18 of the children considered up to date in treatment were awaiting second recall and 4 were not coded for other reasons.

and the beginning of the second was 7.6 months, with three-fourths of the children returning in 5 to 8 months.

Although for the group as a whole there is a consistent decrease in required services as compared with the findings on first recall, these differences are so small as to warrant the opinion that uniform increases in dental need are to be expected in groups of children over periods of 6 months or a year. The data on the two recalls were as follows:

Indicated treatment per child in group	Number of teeth	
	First recall	Second recall
Fillings:		
Deciduous teeth	0.6	0.5
Permanent teeth	2.4	2.0
Extractions:		
Deciduous teeth	.4	.3
Permanent teeth	.1	.1

In table 9 are given the services per child by age group. The numbers of children involved in the table are small, but comparison with table 7 shows that the findings in both tables are quite similar.

TABLE 9.—*Fillings and extractions indicated on second recall, by age group. Philadelphia Mouth Hygiene Association*

Age (in years)	Number of children	Per child in age group			
		Deciduous fillings (teeth)	Permanent fillings (teeth)	Deciduous extractions	Permanent extractions
6 or less	30	1.7	0.4	0.8	0.1
7-9	46	.7	1.7	.3	.1
10-12	49	.1	3.1	.2	.1
13-15	40		2.2		.1
16 and over	8		1.6		
All children	173	.5	2.0	.3	.1

The data for both recalls have been combined in figure 3 to show the approximate age trend in the annual increment of needed fillings and extractions.

Annual increment in required treatment.—An idea of the annual increment can be gained from adding the data in tables 6 and 8. In this group of children, which was fairly evenly distributed by age between 5 and 16 years and consisted largely of white children, the average annual increment was approximately one deciduous tooth and four permanent teeth requiring fillings, 0.7 of a deciduous tooth and 0.2 of a permanent tooth requiring extraction. If two prophylaxes are added, the total of routine services comes to eight.

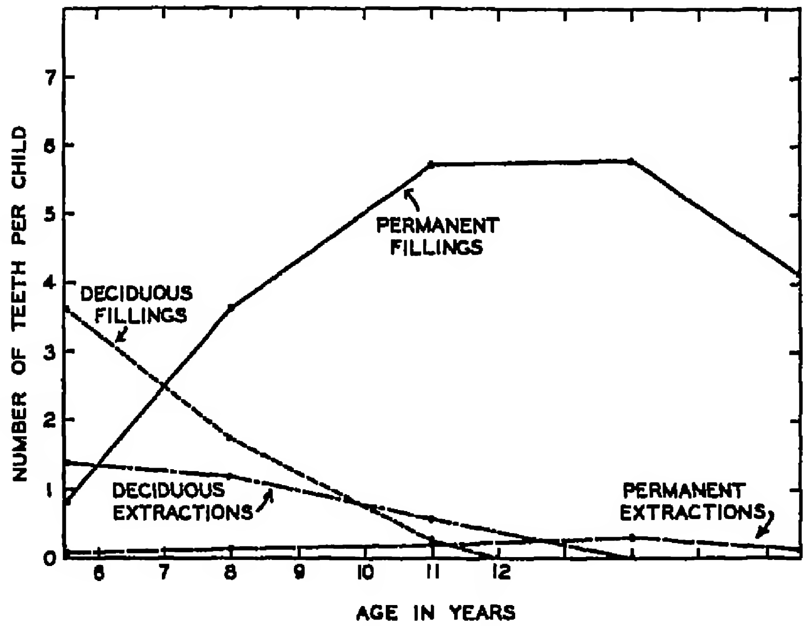

FIGURE 3.—Approximate annual incidence of needed fillings and extractions, by age. Philadelphia Mouth Hygiene Association.

It is important to recognize that this annual increment did not necessarily occur in teeth never previously treated. Many of the fillings, for example, were placed in teeth in which previous cavities had been filled. This raises the question of the additiveness of the data on fillings for the two recalls. Although an overstatement of the number of teeth attacked by caries may result, a measure is obtained of the actual number on which work has to be done.

A more precise estimate of annual increment may be obtained by eliminating the children for whom the interval between completion of the initial series and commencement of the second recall was appreciably more than a year, although the results vary little from those for the entire group. This procedure leaves 122 children for whom the interval was 10 to 15 months, inclusive. For these children, the annual increment in dental need was, on the average, 1.5 deciduous and 3.4 permanent teeth requiring fillings, and 0.6 deciduous and 0.1 permanent tooth requiring extraction. The results are shown graphically in figure 4.

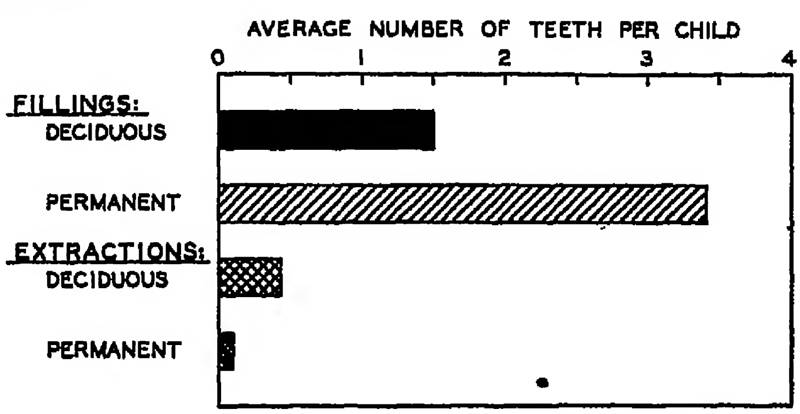

FIGURE 4.—Average annual increment in needed fillings and extractions. Philadelphia Mouth Hygiene Association.

SERVICES PER VISIT

It was remarked earlier that visits per type of service were constant throughout the treatment experience of these children. The following recapitulation brings this out.

Type of service	Children who completed initial series			Initial series incomplete	Weighted average
	Initial series	First recall	Second recall		
	Visits per service				
Prophylaxis	1.02	1.01	1.01	1.05	1.03
Filling (complete tooth):					
Deciduous	.98	.98	.96	.99	.98
Permanent	1.18	1.09	1.04	1.17	1.16
Extraction:					
Deciduous	.79	.81	.83	.71	.77
Permanent	.98	1.03	.92	.97	.98

Three percent of the children require more than one visit for a prophylaxis. In a very small number of instances, more than one deciduous tooth is filled at a visit and more than one permanent tooth extracted. The multiple extraction of deciduous teeth occurs frequently. Between 15 and 20 percent of all permanent teeth require more than one visit to have all cavities or surfaces completely taken care of. (See fig. 5.)

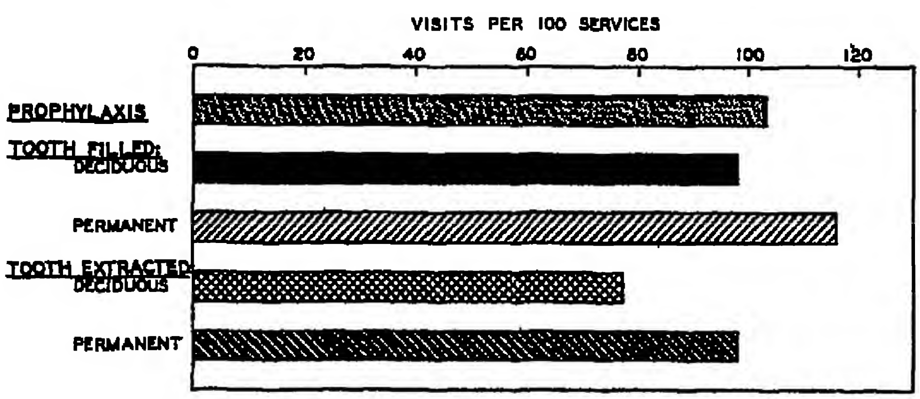

FIGURE 5.—Visits per 100 specified dental services. Philadelphia Mouth Hygiene Association.

These findings stem from a clinic procedure in which the visit is the basis for payment of fees. In general, one service, such as a filling, an extraction, or a prophylaxis, constitutes a visit, but the deviations are quite important. They come largely from the effort to make visits to the clinic of equivalent worth.

This fact is seen from the data on time per service. In the time study (*1*) conducted in the clinics of the Philadelphia Mouth Hygiene Association, the average number of minutes per operation was found to be as follows:

Prophylaxis	15.5
Deciduous filling (complete tooth)	14.3
Permanent filling (complete tooth)	17.4
Deciduous extraction	9.3
Permanent extraction	12.5
Polishing	11.8

The briefest operation was the deciduous extraction; but the extraction of two deciduous teeth at a visit was a frequent occurrence. On the other hand, the longest operation, the filling of a permanent tooth, was often spread over two visits.

From the data on visits and time per service, preliminary estimates can be made of the dental manpower—at the chair—required in treating children's teeth, so far as taking care of the increment is concerned. One advantage in employing visits required rather than number of teeth is that allowance can more adequately be made for time between children, interruptions, etc., and for the administration of the clinic service.

SPECIAL SERVICES

As was previously indicated, the clinics of the Philadelphia Mouth Hygiene Association offer such services as orthodontic and prosthodontic treatments, and root-canal therapy. Orthodontic and prosthodontic services are charged for at fees considered to be within the reach of the economic groups served. It was possible to obtain accurately only the number in this group of children who received such services and not the number considered to need them.

In the entire group of 1,169 children, 61 availed themselves of these opportunities for correction and tooth-saving, with 4 children receiving some combination of services. Thirty received orthodontic treatment, 21 were provided with prosthetic devices, and 18 had root-canal therapy. These are relatively small numbers, but the clinic itself does a substantial amount of work in orthodontics and prosthetics for children who can afford to obtain routine treatment from private dentists but are referred to the clinic by the latter for the costlier services.

SUMMARY

1. An analysis has been made of the dental records of 1,169 children who came to the Central City Clinic of the Philadelphia Mouth Hygiene Association for the first time in 1942 or 1943. The association provides dental care at low cost for children whose families cannot afford private treatment.

2. Fifty-four percent of these children completed the initial series of treatments; 46 percent dropped out before all the treatment indicated for them could be provided. Of the Negro children, 44 percent completed the first series of treatments.

Twenty-five percent of the 1,169 children failed to return in 6 months for reexamination. Of the entire group, 12 percent were up to date in treatment. Younger children showed a greater proneness to continue treatment.

3. Children who failed to complete the initial series of treatments had considerably more need than the children who completed this series. The average number of teeth requiring filling or extraction was 6.9 in the latter group and 9.4 in the former.

4. Indicated services per child for the routine treatments on the first recall (which was begun 7 months after completion of the initial series, on the average) were: fillings, 0.6 deciduous tooth and 2.4 permanent teeth; extractions, 0.4 deciduous tooth and 0.1 permanent tooth.

5. Children who responded to the first recall did not apparently differ in caries susceptibility from those who did not respond. On the initial series, both groups had an average of approximately seven teeth in need of filling or extraction.

6. Services indicated on second recall were slightly less than those on the first: 0.5 filling in deciduous teeth and 2.0 in permanent teeth, 0.3 extraction in deciduous teeth and 0.1 in permanent teeth.

7. There were 122 children for whom the interval between completion of the initial series and beginning of the second recall was 10 to 15 months, or approximately 1 year. For these children, the annual increment in dental need was 1.5 deciduous and 3.4 permanent teeth requiring fillings, 0.6 deciduous and 0.1 permanent tooth requiring extraction.

8. The average number of visits per service in this clinic, where charges are made on a visit basis, were:

Prophylaxis	1.08	Deciduous tooth extracted	0.77
Deciduous tooth filled	.98	Permanent tooth extracted	.98
Permanent tooth filled	1.16		

9. In the entire group of 1,169 children, 30 received orthodontic treatment, 21 were provided with prosthetic devices, and 18 had root-canal therapy.

ACKNOWLEDGMENT

This study was made possible only by the complete cooperation of Lt. Col. William C. Webb, Jr., executive director of the children's dental clinics of the Philadelphia Mouth Hygiene Association, and the members of his staff. Advice and assistance were received from Dr. Antonio Ciocco and Dr. Henry Klein of the Division of Public Health Methods. Responsibility for tabulation and for the preparation of tables and charts was borne by Mrs. Marion Lee Fatt of this Division.

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APPENDIX

TABLE 10.—*Services and visits on initial series of treatments for 465 white children who completed this series. Philadelphia Mouth Hygiene Association*

Service	Children receiving specified service		Number of teeth		Number of visits		
	Number	Percentage	Per child in group	Per child treated	Per child in group	Per child treated	Per tooth treated
Prophylaxis	425	91.4			0.9	1.0	
Fillings:							
Deciduous teeth	183	39.4	1.2	3.0	1.2	3.0	0.99
Permanent teeth	378	81.3	4.2	5.1	4.9	6.1	1.19
Extractions:							
Deciduous teeth	169	36.3	.9	2.5	.7	1.9	.79
Permanent teeth	157	33.8	.7	2.0	.7	1.9	.97
Polishing	343	73.8			.7	[1] .8	
X-ray	57	12.3					
Total services and visits	465	100.0	7.0		[2] 9.2	[2] 9.2	

[1] Per child who had one or more teeth filled.
[2] Includes a small number of visits for zinc oxide and eugenol treatment and treatment with silver nitrate.

TABLE 11.—*Services and visits on initial series of treatments for 335 white children who failed to complete this series. Philadelphia Mouth Hygiene Association*

Kind of operation	Number of children	Percentage of children	Number of teeth		Number of visits		
			Per child in group	Per child needing specified service	Per child in group	Per child needing specified service	Per tooth treated
Prophylaxis	311	92.8			1.0	1.0	
Fillings:							
Deciduous indicated	120	35.8	1.2	3.4			
Deciduous filled	40	11.9	.2	2.0	.2	2.0	1.03
Permanent indicated	302	90.1	5.8	6.5			
Permanent filled	182	54.3	1.7	3.2	2.1	3.8	1.19
Extractions:							
Deciduous indicated	135	40.3	1.3	3.2			
Deciduous extracted	93	27.8	.7	2.5	.5	1.8	.71
Permanent indicated	162	48.4	1.2	2.6			
Permanent extracted	119	35.5	.6	1.8	.6	1.8	.97
Total services and visits	335	100.0	[1] 9.5		[2] 4.6	[2] 4.6	

[1] Indicated for filling or extraction.
[2] Includes a small number of visits for zinc oxide and eugenol treatments.

TABLE 12.—*Services and visits on first recall for 254 white children. Philadelphia Mouth Hygiene Association*

Kind of operation	Number of children	Percentage of children	Number of teeth: Per child in group	Number of teeth: Per child needing specified service	Number of visits: Per child in group	Number of visits: Per child needing specified service	Number of visits: Per tooth treated
Prophylaxis	247	97.2			1.0	1.0	
Fillings:							
Deciduous indicated	70	27.6	0.5	2.0			
Deciduous filled	59	23.2	.5	1.9	.4	1.9	0.98
Permanent indicated	189	74.4	2.4	3.3			
Permanent filled	173	68.1	1.9	2.8	2.0	3.0	1.07
Extractions:							
Deciduous indicated	50	19.7	.3	1.7			
Deciduous extracted	44	17.3	.3	1.7	.2	1.4	.85
Permanent indicated	18	7.1	.1	1.8			
Permanent extracted	17	6.7	.1	1.4	.1	1.4	1.00
Total services and visits	254	100.0	[1] 3.3		[2] 4.3	[2] 4.3	

[1] Indicated for filling or extraction.
[2] Includes visits for polishing and a small umber of visits for zinc oxide and eugenol treatment and treatment with silver nitrate.

TABLE 13.—*Services and visits on second recall for 129 white children Philadelphia Mouth Hygiene Association*

Kind of operation	Number of children	Percentage of children	Number of teeth: Per child in group	Number of teeth: Per child needing specified service	Number of visits: Per child in group	Number of visits: Per child needing specified service	Number of visits: Per tooth treated
Prophylaxis	119	92.2			0.9	1.0	
Fillings:							
Deciduous indicated	32	24.8	0.5	1.9			
Deciduous filled	31	24.0	.4	1.8	.4	1.8	0.96
Permanent indicated	84	65.1	1.9	2.9			
Permanent filled	84	65.1	1.7	2.6	1.8	2.7	1.05
Extractions:							
Deciduous indicated	18	14.0	.3	2.1			
Deciduous extracted	15	11.6	.2	1.9	.2	1.6	.86
Permanent indicated	6	4.7	.1	1.5			
Permanent extracted	6	4.7	.1	1.5	.1	1.3	.89
Total services and visits	129	100.0	[1] 2.8		[2] 3.7	[2] 3.7	

[1] Indicated for filling or extraction.
[2] Includes visits for polishing.

PUBLIC HEALTH SERVICE PUBLICATIONS

A List of Publications Issued During the Period January–June 1946

There is given herewith a list of publications of the United States Public Health Service issued during the period January–June 1946.

The purpose of this list is to provide a complete and continuing record of Public Health Service publications, for reference use by librarians, scientific workers, and others interested in particular fields of public health work, and not to offer the publications for indiscriminate free distribution.

Single sample copies are available fron the Public Inquiries Section, Office of Health Information, United States Public Health Service, Washington 25, D. C.

Quantities may be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., at prices shown, with a reducton of 25 percent on lots of 100 copies or more of a single publication.

Those publications marked with an asterisk (*) can be obtained only by purchase.

Periodicals

*Public Health Reports (weekly), January–June, vol. 61, Nos. 1 to 26, pages 1 to 977. 10 cents a number.

*The Journal of Venereal Disease Information (monthly), January–June, vol. 27, Nos. 1 to 6, pages 1 to 168. 5 cents a number.

*Journal of the National Cancer Institute (bimonthly), February–June, vol. 6, Nos. 4 to 6, pages 196 to 377. 40 cents a number.

Public Health Engineering Abstracts (monthly), January–June, vol. XXVI, Nos. 1 to 6, 32 pages each. No sales stock.

National Negro Health News (quarterly), January–June, vol. 14, Nos. 1 and 2, 24 pages each. No sales stock.

Extracts from Public Health Reports
Tuberculosis Control Issues

1. Editorial. (By Herman E. Hilleboe.) Rehabilitation and aftercare in tuberculosis. I. General Problems. By Herman E. Hilleboe and Norvin C. Kiefer. Photofluorographic roll-film viewers. By Ira Lewis. Tuberculosis mortality in major cities: United States, 1942–43. By R. V. Kasius and E. H. Pitney. Characteristics of commercial X-ray intensifying screens: resolving power. Excerpt from "Tuberculosis in Holland during the war." March 1, 1946. 32 pages; 2 plates. No sales stock.
2. Editorial—Teamwork in tuberculosis control. (By Herman E. Hilleboe.) Geographic differences in sensitivity to histoplasmin among student nurses. By Carroll E. Palmer. Tuberculosis mortality in the United States and in each State: 1944. By J. Yerushalmy and I. M. Moriyama. April 5, 1946. 44 pages. No sales stock.
3. Editorial—Tuberculosis record systems. (By Herman E. Hilleboe.) The modalities of bed rest. By William M. Peck. Review of tuberculosis control demonstrations and the program of grants-in-aid. By Francis J.

Weber. Isolation of *Mycobacterium tuberculosis* from gastric contents neutralized after varying periods. By Marian G. Sprick and John W. Towey. Excerpts from "How much control of tuberculosis." A forecast (excerpt from "The Modern Attack on Tuberculosis"). May 3, 1946. 30 pages; 6 plates. No sales stock.

4. Editorial—BCG vaccination against tuberculosis. (By Herman E. Hilleboe.) Experience with BCG vaccine in the control of tuberculosis among North American Indians. By Joseph D. Aronson and Carroll E. Palmer. Indolent early tuberculosis. Excerpt from "Rehabilitating the tuberculous." Excerpt from "Chemotherapy in tuberculosis." Excerpt from "Tuberculosis in Sweden and the fight against it in recent years." New films available on administration of mass radiography programs. Laryngeal swabs for detection of tuberculosis. June 7, 1946. 30 pages. No sales stock.

Reprints From the Public Health Reports

2686. A cycle of morphine addiction. Biological and psychological studies. Part I: Biological investigations. By Edwin G. Williams and Fred W. Oberst. Part II: Psychological investigations. By Ralph R. Brown. January 4 and 11, 1946. 42 pages. 10 cents.

2687. The release of antigen from certain bacteria on treatment with ether. By Charles C. Shepard. January 11, 1946. 6 pages. 5 cents.

2688. An epidemic of a severe pneumonitis in the bayou region of Louisiana. VI. A comparative study of the viruses of lymphogranuloma venereum, psittacosis and Louisiana pneumonitis. By C. L. Larson and B. J. Olson. January 18, 1946. 10 pages. 5 cents.

2689. Tularemia. Attempted transmission by each of two species of fleas: *Xenopsylla cheopis* (Roths.) and *Diamanus montanus* (Baker). By F. M. Prince and M. C. McMahon. January 18, 1946. 8 pages. 10 cents.

2690. Physical impairments of members of low-income farm families—11,490 persons in 2,477 Farm Security Administration borrower families, 1940. VI. Extent of immunization against smallpox, diphtheria, and typhoid fever. By Mary Gover and Jesse B. Yaukey. January 25, 1946. 18 pages. 5 cents.

2691. Composition of some trade name solvents used for cleaning and degreasing and for thinning paints. By Allen D. Brandt, W. J. McConnell, and R. H. Flinn. February 1, 1946. 12 pages. 5 cents.

2692. Influence of pH and temperature on the survival of coliforms and enteric pathogens when exposed to chloramine. By C. T. Butterfield and Elsie Wattie. February 8, 1946. 36 pages. 10 cents.

2693. Diphtheria incidence and trends in relation to artificial immunization with some comparative data for scarlet fever. By Selwyn D. Collins. February 15, 1946. 38 pages. 10 cents.

2694. The increase in tuberculosis proportionate mortality among nonwhite young adults. By J. Yerushalmy. February 22, 1946. 8 pages. 5 cents.

2695. Negro mortality. I. Mortality from all causes in the death registration States. By Mary Gover. February 22, 1946. 8 pages. 5 cents.

2696. The incidence of poliomyelitis and its crippling effects, as recorded in family surveys. By Selwyn D. Collins. March 8, 1946. 28 pages. 10 cents.

2697. Public Health Service drinking water standards, 1946. March 15, 1946. 14 pages. 5 cents.

2698. The excretion of DDT (2, 2–bis–(p–chlorophenyl)–1, 1, 1–trichloroethane) in man, together with clinical observations. By P. A. Neal, T. R. Sweeney, S. S. Spicer, and W. F. von Oettingen. March 22, 1946. 8 pages. 5 cents.

2699. Alterations in the cardiac conduction mechanism in experimental thiamine deficiency. By W. D. King and W. H. Sebrell. March 22, 1946. 7 pages; 2 plates. 5 cents.

2700. Cerebrospinal meningitis. A chronological record of reported cases and deaths. By Mary Gover and Glee Jackson. March 29, 1946. 17 pages. 10 cents.

2701. Some physical properties of DDT and certain derivatives. By Howard L. Andrews, William C. White, Loubov R. Gamow, and Dorothy C. Peterson. March 29, 1946. 8 pages; 1 plate. 15 cents.

2702. A method of conducting the 50 percent hemolysis end point complement-fixation test for parasitic diseases. By John Bozicevich, Helen M. Hoyem, and Vernal M. Walston. April 12, 1946. 6 pages. 5 cents.

2703. Streptomycin in experimental plague. By J. W. Hornibrook. April 12, 1946. 4 pages. 5 cents.

2704. Sequestration of calcium and magnesium in the presence of alkaline detergents. By Edward H. Mann and C. C. Ruchhoft. April 12, 1946. 8 pages. 5 cents.

2705. A statistical study of 500 psychopathic prisoners. By Hulsey Cason and M. J. Pescor. April 19, 1946. 17 pages. 10 cents.

2706. A public health program for rural areas. By Frederick D. Mott. April 26, 1946. 9 pages. 5 cents.

2707. Homologous serum jaundice. Experimental inactivation of etiologic agent in serum by ultraviolet irradiation. By John W. Oliphant and Alexander Hollaender. April 26, 1946. 6 pages; 1 plate. 5 cents.

2708. Comparative assays of rodenticides on wild Norway rats. I. Toxicity. By Sally H. Dieke and Curt P. Richter. May 10, 1946. 7 pages. 5 cents.

2709. Chlorine as a possible ovicide for *Aedes aegypti* eggs. By Stephen P. Hatchett. May 10, 1946. 4 pages. 5 cents.

2710. Shadowed replicas of tooth surfaces. By David B. Scott and Ralph W. G. Wyckoff. May 17, 1946. 10 pages; 6 plates. 5 cents.

2711. The preparation of antigens from yolk sacs infected with rickettsiae. By Norman H. Topping and Charles C. Shepard. May 17, 1946. 8 pages. 5 cents.

2712. The tropical disease education program of the United States Public Health Service. By William S. Boyd, Trawick H. Stubbs and Paul P. Weinstein. May 17, 1946. 6 pages. 5 cents.

2713. Training public health workers. Programs sponsored by State health departments under Title VI of the Federal Social Security Act and the Federal Venereal Disease Control Act (1936–44). By Joseph W. Mountin and Emily K. Hankla. May 24, 1946. 24 pages. 10 cents.

2714. The nature of the soluble antigen from typhus rickettsiae. By Charles C. Shepard and Ralph W. G. Wyckoff. May 31, 1946. 8 pages; 4 plates. 5 cents.

2715. Antibacterial action of penicillin, penicillin X, and streptomycin on *Hemophilus influenzae*. By William L. Hewitt and Margaret Pittman. May 31, 1946. 12 pages. 5 cents.

2716. A method for the preparation of tsutsugamushi (scrub typhus) antigen from infected yolk sacs. By Norman H. Topping and Charles C. Shepard. May 31, 1946. 4 pages. 5 cents.

2717. How does housing affect health? By M. Allen Pond. May 10, 1946. 8 pages. 5 cents.

2718. Electrocardiographic alterations in adult rats as a result of acute thiamine deficiency. By James M. Hundley and W. H. Sebrell. June 14, 1946. 16 pages; 5 plates. 10 cents.

2719. Studies of the acute diarrheal diseases. XVII. The sulfonamides in shigellosis. By Albert V. Hardy. June 14, 1946. 9 pages. 5 cents.

2720. Full-time public health positions in local health departments. By Marion E. Altenderfer. June 14, 1946. 10 pages. 5 cents.

2721. A performance test for rating dishwashing detergents. By Edward H. Mann and C. C. Ruchhoft. June 14, 1946. 12 pages; 2 plates. 10 cents.

2722. A serological study of 37 cases of tsutsugamushi disease (scrub typhus) occurring in Burma and the Philippine Islands. By Ida A. Bengtson. June 14, 1946. 8 pages. 5 cents.

2723. Complement fixation in tsutsugamushi disease (scrub typhus). By Ida A. Bengtson. June 14, 1946. 6 pages. 5 cents.

2724. Incidence of poliomyelitis in the United States in 1945. By C. C. Dauer. June 21, 1946. 8 pages. 5 cents.

2725. *Plasmodium gallinaceum* infection characterized by predominance of exo-erythrocytic forms. By Victor H. Haas, Aimee Wilcox, Frances Park Davis, and Frances Moore Ewing. June 21, 1946. 7 pages. 5 cents.

2726. Prevalence of typhus complement-fixing antibodies in human serums in San Antonio, Texas. By David E. Davis and Morris Pollard. June 21, 1946. 4 pages. 5 cents.

2727. Conclusions concerning psychiatric training and clinics. Meeting of consultants in mental hygiene, United States Public Health Service September 6, 1945. June 28, 1946. 16 pages. 5 cents.

2728. Promizole treatment of leprosy. A preliminary report. By G. H. Faget, R. C. Pogge and F. A. Johansen. June 28, 1946. 4 pages; 1 plate. 5 cents.

2729. Present status of diasone in the treatment of leprosy. Brief clinical note. By G. H. Faget, R. C. Pogge and F. A. Johansen. June 28, 1946. 8 pages; 3 plates. 5 cents.

1137. Questions and answers on smallpox and vaccination. By J. P. Leake. Revised 1946. 28 pages. 10 cents.

Supplements to Public Health Reports

133. The public health nurse and you. Revised 1946. 13 pages, illustrated. 10 cents.

190. The notifiable diseases. Prevalence of certain important communicable diseases, by States, 1944. 1946. 14 pages. 5 cents.

National Institute of Health Bulletins

184. The genus *Ixodes* in North America. By R. A. Cooley and Glen M. Kohls. 1945. 246 pages. 40 cents.

185. The toxicity and potential dangers of methyl bromide with special reference to its use in the chemical industry, in fire extinguishers, and in fumigation. By W. F. von Oettingen. 1946. 41 pages. 15 cents.

186. The effects of aliphatic nitrous and nitric acid esters on the physiological functions with special reference to their chemical constitution. By W. F. von Oettingen. 1946. 76 pages. 15 cents.
187. The genera *Boophilus*, *Rhipicephalus*, and *Haemaphysalis* (*Ixodidae*) of the new world. By R. A. Cooley. 54 pages. 15 cents.

Annual Report

Annual Report of the United States Public Health Service for the fiscal year 1945. 1945. 156 pages. 30 cents.

Unnumbered Publications

Index to Public Health Reports, vol. 60, part 2, July–December 1945. 1946. 16 pages. 5 cents.

Index to Journal of the National Cancer Institute, vol. VI, August 1945–June 1946. 1946. 6 pages. 5 cents.

Set your cap for the U. S. Public Health Service. 1946. 8 page folder, illustrated. No sales stock.

National Negro Health Week program. This pamphlet is published annually, usually during March, for community leaders in an effort to suggest ways and means by which interested individuals and organizations may be organized for a concerted and effective attack upon the community's disease problems. Thirty-second observance, March 31–April 7. 4 pages. Out of print.

National Negro Health Week leaflet. Thirty-second observance. 1946. 2 pages. Out of print.

National Negro Health Week poster. Thirty-second observance. 1946. Out of print.

Reprints from The Journal of Venereal Disease Information

253. The synergistic action of penicillin and mapharsen (oxophenarsine hydrochloride) in the treatment of experimental syphilis. By Harry Eagle, Harold J. Magnuson and Ralph Fleischman. January 1946. 8 pages. 5 cents.
254. San Francisco industrial venereal disease educational and case-finding program. By Richard A. Koch, Lawrence Arnstein, and Arthur C. Painter. January 1946. 12 pages. 5 cents.
255. A plan for revitalizing National venereal disease control. By J. R. Heller, Jr., Lida J. Usilton and Arch B. Clark. February 1946. 6 pages. 5 cents.
256. Untreated syphilis in the male Negro. II. Mortality during 12 years of observation. By J. R. Heller, Jr., and P. T. Bruyere. The effect of treated acquired syphilis on life expectancy. By Dudley C. Smith and Martha C. Bruyere. Mortality trends for syphilis. By Lida J. Usilton. February 1946. 20 pages. 10 cents.
257. Cooperation of health officers and police departments. By Eugene A. Gillis. March 1946. 4 pages. 5 cents.
258. Preliminary report evaluating the worth of obtaining names of suspected contacts during a regular contact interview. By W. D. Hazlehurst, C. P. Stevick, and Harold A. Kahn. March 1946. 4 pages. 5 cents.
259. The revised reports and forms of the Veneral Disease Division. By J. R. Heller, Jr. and L. J. Usilton. April 1946. 8 pages. 5 cents.
260. Blood testing and treatment program in Jefferson County, Alabama. By W. H. Y. Smith and George A. Denison. April 1946. 11 pages. 5 cents.

261. Studies on chancroid. III. Ducrey skin reactions in Negro hospital patients. By Albert Heyman and Paul B. Beeson. April 1946. 4 pages. 5 cents.
262. Cases of syphilis and gonorrhea reported for the first time in States, territories and possessions for the year 1945. 1 page. 5 cents.
263. The systemic treatment of arsenic poisoning with BAL (2, 3-Di-mercaptopropanol). By Harry Eagle. May 1946. 8 pages. 5 cents.
264. False positive serologic reactions for syphilis in lymphogranuloma venereum. By Albert Heyman and E. L. Webb. May 1946. 6 pages. 5 cents.
265. Studies in syphilis. VI. Fibrosis and round cell infiltration of the parenchymatous organs (Warthin) in relation to serodiagnostic findings. By Paul D. Rosahn. May 1946. 4 pages. 5 cents.
266. National venereal disease control. Report of the committee on venereal disease control to the State and Territorial Health Officers' Association, April 1946. June 1946. 5 pages. 5 cents.

Supplements to The Journal of Venereal Disease Information

4. Directory of clinics for the diagnosis and treatment of venereal diseases. Revised 1946. 52 pages. 15 cents.
20. Postwar venereal disease control. Proceedings, National Conference, St. Louis, Missouri, November 1944. 213 pages. 35 cents.

December 1–28, 1946

The accompanying table summarizes the incidence of nine important communicable diseases, based on weekly telegraphic reports from State health departments. The reports from each State for each week are published in PUBLIC HEALTH REPORTS under the section "Incidence of Disease." The table gives the number of cases of these diseases for the 4 weeks ended December 28, 1946, the number reported for the corresponding period in 1945, and the median number for the years 1941–45.

DISEASES ABOVE MEDIAN INCIDENCE

Influenza.—The number of reported cases of influenza was about normal for this season of the year. For the 4 weeks ended December 28 there were 11,686 cases reported, which was only slightly above the 1941–45 median. In the West North Central, South Atlantic and Mountain sections the numbers of cases were about normal, but in all other sections of the country the incidence was below the seasonal expectancy. Of the total cases, Texas reported 5,593, South Carolina 1,702, Virginia 1,689 and Arizona 809 cases—more than 80 percent of all cases were reported from those 4 States. The 1945–46 influenza epidemic reached its peak during the week ended December 15, 1945, a total of approximately 149,000 cases being reported for the week,

and for the 4 weeks corresponding to the current 4-week period there were nearly 320,000 cases reported.

Poliomyelitis.—Although the incidence of poliomyelitis dropped more than 50 percent from the preceding 4-week period, the number of cases (668) reported for the current 4 weeks was 1.5 times the 1945 incidence for the corresponding weeks and 2.5 times the 1941–45 median. The number of cases was higher than in 1945 in all sections except the Mountain and Pacific. All sections reported excesses over the preceding 5-year medians. Although the rate of decline of this disease since the recent epidemic has been about normal, there is still a relatively high number of cases being reported. The number of cases (668) was the highest reported for this period in the 18 years for which these data are available. States reporting more than 30 cases for the current 4-week period were California 74, Illinois 61, New York 58, Wisconsin 39, Michigan 38, and Missouri 33.

Whooping cough.—For the 4 weeks ended December 28 there were 8,709 cases of whooping cough reported, as compared with 7,297 for the corresponding weeks in 1945. The 1941–45 median was represented by the 1945 incidence. In the Middle Atlantic, East North Central, South Atlantic, and West South Central sections the incidence was somewhat above the normal seasonal expectancy, but in the other five sections of the country the numbers of cases were below the preceding 5-year median.

DISEASES BELOW MEDIAN INCIDENCE

Diphtheria.—For the 4 weeks ended December 28 there were 1,415 cases of diphtheria reported as compared with 1,819 for the corresponding period in 1945 and a 5-year (1941–45) median of 1,517 cases. From the latter part of 1944 until July 1946 there was a consistent increase in the incidence of this disease, but since that time the number of cases for each 4-week period has been less than for the corresponding period in 1945, as well as lower than the preceding 5-year median for each period. In the southern part of the country where the disease has been most prevalent, there has been a very appreciable decline in the number of cases, but in the New England and Middle Atlantic sections where the disease has also been relatively high, the current incidence was 3.1 and 1.5, respectively, times the preceding 5-year median. Only four of the nine geographic sections reported more cases during this period than in 1945 but all except two sections, the West South Central and Pacific, reported excesses over the preceding 5-year median.

Measles.—The incidence of measles was relatively low, 9,902 cases being reported during the current 4-week period as compared with a 5-year median of approximately 17,000 cases. The New England

and South Atlantic sections each reported a relatively high incidence, but in the other seven sections the numbers of cases were considerably below the median expectancy.

Meningococcus meningitis.—The incidence of meningococcus meningitis (248 cases) was about 50 percent of the 1945 incidence for the corresponding 4 weeks. The 1941–45 median was represented by the 1945 figure (498 cases). The number of cases in each geographic section was lower than the 1941–45 median. For the country as a whole, the current incidence was the lowest since 1941 when there were 143 cases reported for the corresponding 4-week period.

Scarlet fever.—For the current 4-week period there were 8,257 cases of scarlet fever reported, as compared with 10,391 during the corresponding period in 1945 and a preceding 5-year median of 11,821 cases. In each section of the country the number of cases was less than the 1941–45 median, and for the country as a whole the current incidence was the lowest for this period in the 18 years for which data are available in this form.

Smallpox.—Seven cases of smallpox were reported for the current 4-week period, as compared with 23 for the same period in 1945 and a 1941–45 median of 32 cases. In the West North Central section 4 cases were reported as compared with a preceding 5-year median of 10 cases, and in the East North Central there was 1 case reported as against a median of 18 cases. No cases were reported from any other section except the West South Central where 2 cases were reported as compared with a 5-year median of 7 cases.

Typhoid and paratyphoid fever.—The number of cases of these diseases continued at a relatively low level, the 166 cases reported for the 4 weeks ended December 28 being only about 80 percent of the 1945 incidence and 65 percent of the 1941–45 median. In the Mountain section the number of cases (21) was 1.6 times the normal expectancy, but in all other sections of the country the incidence was below the preceding 5-year median.

MORTALITY, ALL CAUSES

For the 4 weeks ended December 28 there were 38,086 deaths from all causes reported to the Bureau of the Census by 93 large cities. The average number of deaths reported for the same weeks in the years 1943–45 was 43,044. For each week of the current 4-week period the number of deaths was less than the preceding 3-year average, the decreases ranging from 2 percent during the first week to 21 percent during the last week of the period. For the 4 weeks ended December 28 the number of deaths was 11.5 percent less than the 1943–45 average.

The birth rate (28.8 per 1,000 population) for the month of November (the latest data available) was the highest since the establishment of the birth registration area in 1915. On the other hand, the general and infant mortality rates for September, October, and November were the lowest in recent years. Infant mortality rates for those months represented about 10-percent reductions over the corresponding months of last year, but the decreases were less for general mortality.

Number of reported cases of nine communicable diseases in the United States during the 4-week period December 1–28, 1946, the number for the corresponding period in 1945, and the median number of cases reported for the corresponding period, 1941–45

Division	Current period	1945	5-year median	Current period	1945	5-year median	Current period	1945	5-year median
	Diphtheria			Influenza [1]			Measles [2]		
United States	1,415	1,810	1,517	11,686	319,576	11,556	9,902	10,381	17,320
New England	104	50	34	30	498	102	2,816	765	1,919
Middle Atlantic	196	95	127	60	729	121	3,327	2,930	3,699
East North Central	197	282	181	167	7,122	341	965	1,969	1,655
West North Central	128	146	110	112	33,904	157	102	435	1,100
South Atlantic	257	416	248	3,734	49,663	3,755	1,348	563	563
East South Central	206	205	166	333	124,382	662	134	666	603
West South Central	153	415	332	6,100	59,697	7,444	213	316	434
Mountain	74	147	68	1,065	42,055	1,016	563	685	1,300
Pacific	100	63	116	85	1,520	418	439	2,052	2,052
	Meningococcus meningitis			Poliomyelitis			Scarlet fever		
United States	248	498	498	668	458	207	8,257	10,391	11,821
New England	18	20	39	36	23	16	898	744	1,250
Middle Atlantic	47	115	115	81	52	52	1,799	1,902	2,252
East North Central	41	99	99	178	100	32	2,566	2,883	3,114
West North Central	16	34	34	128	45	19	644	898	1,323
South Atlantic	41	56	87	49	43	26	664	1,089	1,129
East South Central	24	54	54	32	23	11	333	504	504
West South Central	25	48	43	61	84	32	188	713	392
Mountain	9	13	25	19	21	15	407	530	640
Pacific	27	64	71	104	117	60	758	1,128	1,128
	Smallpox			Typhoid and paratyphoid fever			Whooping cough [2]		
United States	7	28	32	166	207	251	8,709	7,297	7,297
New England	0	0	0	14	11	16	1,044	1,109	1,109
Middle Atlantic	0	0	0	21	20	32	2,289	2,024	2,024
East North Central	1	4	18	20	30	30	2,348	1,671	1,671
West North Central	4	5	10	7	4	8	267	189	396
South Atlantic	0	0	1	26	32	39	1,065	825	932
East South Central	0	5	4	22	20	31	346	187	391
West South Central	2	4	7	23	57	48	770	529	587
Mountain	0	4	2	21	12	18	243	225	302
Pacific	0	1	0	12	12	21	337	538	566

[1] Mississippi and New York excluded; New York City included.
[2] Mississippi excluded.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JANUARY 4, 1947

Summary

A total of 96 cases of poliomyelitis was reported for the current week, as compared with 103 last week and a 5-year (1942–46) median of 34. The only States reporting more than 4 cases are California (12), Michigan (18), and Wisconsin (13). Since March 15, 1946, the approximate average date of lowest seasonal incidence, a total of 24,863 cases has been reported, as compared with 13,394 and 19,061, respectively, for the corresponding periods of 1945–46 and 1944–45, and a 5-year median of 12,133.

A slight increase was recorded in the incidence of influenza during the week. A total of 3,665 cases was reported, as compared with 2,660 last week, 48,041 for the corresponding week last year, and a 5-year median of 4,587. Of the current total, 4 States reported 3,044 cases, or approximately 83 percent, as follows (last week's figures in parentheses): Texas 1,431 (1,159), South Carolina 789 (271), Virginia 615 (487), and Arizona 209 (131). For the corresponding week last year these 4 States reported an aggregate of 20,507 cases, or 43 percent of the total. Currently, no other State reported more than 90 cases, and only 4 other States reported more than 50 cases. The total since the low seasonal incidence last year (July 28) is 36,640 cases, as compared with 410,289 for the corresponding period ended January 5, 1946, and 39,662 for the corresponding 5-year median.

Total cases reported for other diseases included in the following tables are as follows (figures for the corresponding week of last year in parentheses): Diphtheria 366 (458), the dysenteries (amebic, bacillary, and unspecified) 832 (588), infectious encephalitis 4 (6), measles 2,995 (2,769), meningococcus meningitis 83 (191), Rocky Mountain spotted fever 1 (0), scarlet fever 2,080 (2,383), smallpox 3 (4), tularemia 51 (20), typhoid and paratyphoid fever 38 (40), endemic typhus fever 37 (67), undulant fever 86 (39), whooping cough 1,746 (1,373).

Deaths recorded for the week in 93 large cities of the United States totaled 10,209, as compared with 11,928 and 9,786, respectively, for the corresponding weeks of 1946 and 1945, and a 3-year (1944–46) median of 11,928.

Telegraphic morbidity reports from State health officers for the week ended Jan. 4, 1947, and comparison with corresponding week of 1946 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46
	Jan. 4, 1947	Jan. 5, 1946		Jan. 4, 1947	Jan. 5, 1946		Jan. 4, 1947	Jan. 5, 1946		Jan. 4, 1947	Jan. 5, 1946	
NEW ENGLAND												
Maine	8	0	0	1	2	1	260	12	25	1	0	2
New Hampshire	0	1	0	1	3	3	10	--------	6	0	0	0
Vermont	0	1	0	--------	32	24	126	3	7	0	0	0
Massachusetts	21	4	5	--------	--------	--------	247	236	236	3	5	8
Rhode Island	0	0	0	--------	--------	25	16	--------	7	0	0	0
Connecticut	0	3	1	2	558	11	84	21	32	0	2	2
MIDDLE ATLANTIC												
New York	25	15	15	[1] 8	[1] 78	[1] 17	112	316	493	4	14	22
New Jersey	4	6	3	4	155	27	120	26	184	1	15	15
Pennsylvania	11	10	16	4	19	7	778	--------	801	1	7	10
EAST NORTH CENTRAL												
Ohio	18	48	12	5	175	26	211	23	40	6	10	10
Indiana	21	13	13	23	124	49	18	38	42	0	4	4
Illinois	3	17	16	4	49	18	23	327	169	6	9	9
Michigan [2]	5	2	3	--------	8	8	126	52	52	4	0	1
Wisconsin	4	7	2	33	1,494	62	77	45	273	2	2	2
WEST NORTH CENTRAL												
Minnesota	9	4	4	--------	8	1	6	4	6	0	1	1
Iowa	0	9	5	--------	59	2	1	16	44	4	5	2
Missouri	8	3	3	1	23	10	6	41	27	2	5	7
North Dakota	8	2	2	2	25	36	2	1	1	1	0	1
South Dakota	0	0	2	--------	--------	--------	7	10	10	1	0	0
Nebraska	0	2	4	--------	819	60	1	14	12	1	0	1
Kansas	3	10	6	36	3,705	9	4	93	64	1	1	2
SOUTH ATLANTIC												
Delaware	0	0	0	--------	--------	--------	--------	2	2	0	2	0
Maryland [2]	14	13	10	5	69	11	10	10	13	0	6	6
District of Columbia	0	0	0	1	10	6	15	2	5	2	2	2
Virginia	3	19	15	615	5,323	659	86	85	85	1	9	9
West Virginia	12	3	3	65	2,356	59	22	4	61	6	6	2
North Carolina	8	37	24	--------	--------	6	160	53	53	2	8	8
South Carolina	18	7	7	789	3,017	688	45	61	61	6	3	4
Georgia	18	13	13	12	411	181	89	19	19	0	2	2
Florida	6	6	7	7	8	8	1	19	19	0	5	2
EAST SOUTH CENTRAL												
Kentucky	21	4	4	3	1,953	2	--------	119	66	2	4	4
Tennessee	16	10	10	22	681	89	8	22	39	1	4	6
Alabama	8	8	7	69	2,407	413	27	9	9	2	4	4
Mississippi [2]	14	14	13	--------	--------	--------	--------	--------	--------	8	1	1
WEST SOUTH CENTRAL												
Arkansas	1	13	7	53	1,204	192	13	12	39	1	0	0
Louisiana	18	16	9	3	6,314	21	11	6	11	1	2	2
Oklahoma	2	8	7	90	2,245	187	10	31	15	1	3	8
Texas	27	67	48	1,431	11,510	2,250	25	91	91	8	13	9
MOUNTAIN												
Montana	1	1	1	44	350	31	70	2	88	0	0	0
Idaho	1	3	1	19	79	2	4	100	24	0	1	1
Wyoming	0	3	1	14	6	6	2	3	10	0	0	0
Colorado	8	4	6	22	195	62	2	59	87	2	5	2
New Mexico	1	3	3	2	1	1	8	--------	3	0	2	1
Arizona	7	7	1	200	657	195	64	6	7	0	1	1
Utah [2]	0	0	0	28	1,114	32	10	72	48	1	0	1
Nevada	0	0	0	--------	--------	--------	--------	15	4	0	0	0
PACIFIC												
Washington	10	8	7	--------	--------	1	20	241	31	0	0	2
Oregon	3	9	2	25	269	22	29	34	55	0	7	7
California	11	30	30	13	436	108	29	414	225	6	21	21
Total	366	458	372	3,665	48,041	4,587	2,995	2,769	7,892	83	191	298
Seasonal low week [3]	(27th) July 5–11			(30th) July 26–Aug. 1			(35th) Aug. 30–Sept. 5			(37th) Sept. 13–19		
Total since low	7,931	12,102	9,444	36,640	410,289	39,662	25,882	28,893	46,195	1,054	1,695	1,695

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Dates between which the approximate low week ends. The specific date will vary from year to year.

Telegraphic morbidity reports from State health officers for the week ended Jan. 4, 1947, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever [4]		
	Week ended—		Median 1942–46	Week ended		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46
	Jan. 4, 1947	Jan. 5, 1946		Jan. 4, 1947	Jan. 5, 1946		Jan. 4, 1947	Jan. 5, 1946		Jan. 4, 1947	Jan. 5, 1946	
NEW ENGLAND												
Maine	1	0	0	48	35	16	0	0	0	0	0	0
New Hampshire	1	1	0	7	2	6	0	0	0	0	0	0
Vermont	1	1	0	12	4	5	0	0	0	0	0	1
Massachusetts	0	1	1	144	163	262	0	0	0	3	0	0
Rhode Island	0	0	0	10	12	13	0	0	0	0	0	1
Connecticut	0	0	0	26	31	49	0	0	0	0	1	1
MIDDLE ATLANTIC												
New York	4	6	3	226	263	367	0	0	0	1	4	2
New Jersey	1	1	1	94	56	76	0	0	0	0	1	0
Pennsylvania	3	0	0	118	146	226	0	0	0	2	3	3
EAST NORTH CENTRAL												
Ohio	1	3	1	284	216	290	1	0	0	4	2	3
Indiana	4	1	1	103	56	92	1	1	2	2	0	1
Illinois	2	0	0	129	139	213	0	0	0	1	3	2
Michigan [2]	18	0	0	165	39	66	0	0	0	1	0	0
Wisconsin	13	10	0	69	84	145	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	0	0	0	32	22	66	0	0	0	0	0	0
Iowa	2	0	0	17	39	39	0	0	0	0	0	0
Missouri	2	1	1	35	88	52	0	0	0	0	1	0
North Dakota	0	0	0	6	5	16	0	0	0	0	0	0
South Dakota	1	0	0	16	11	39	0	0	0	1	0	0
Nebraska	1	0	0	10	48	33	0	0	0	0	0	0
Kansas	4	0	0	25	80	80	0	0	0	1	0	0
SOUTH ATLANTIC												
Delaware	0	0	0	6	6	9	0	0	0	0	0	0
Maryland [2]	0	0	0	19	55	55	0	0	0	0	0	1
District of Columbia	0	0	0	4	5	15	0	0	0	0	3	0
Virginia	2	0	1	25	55	55	0	0	0	0	2	2
West Virginia	0	0	0	16	38	49	0	0	0	1	1	0
North Carolina	3	0	0	37	51	81	0	1	0	1	0	0
South Carolina	0	0	0	28	6	11	0	0	0	1	2	1
Georgia	3	1	0	9	12	23	0	0	0	1	0	1
Florida	1	0	0	10	6	8	0	0	0	0	0	0
EAST SOUTH CENTRAL												
Kentucky	0	0	0	40	40	48	0	0	0	2	0	1
Tennessee	0	2	1	15	49	49	0	0	0	1	5	1
Alabama	1	1	0	19	22	22	0	0	0	0	0	1
Mississippi [2]	1	3	1	4	15	15	1	0	0	1	0	0
WEST SOUTH CENTRAL												
Arkansas	1	1	1	3	9	7	0	0	0	0	1	1
Louisiana	3	1	0	4	16	10	0	0	0	4	2	2
Oklahoma	3	1	1	6	46	25	0	1	0	0	0	1
Texas	3	5	4	26	87	83	0	0	1	1	7	5
MOUNTAIN												
Montana	0	0	1	5	13	17	0	0	0	0	0	0
Idaho	0	0	0	13	7	8	0	0	1	2	0	0
Wyoming	0	0	0	5	1	7	0	0	0	0	0	0
Colorado	2	0	0	30	29	30	0	0	0	1	0	0
New Mexico	0	0	0	6	13	10	0	0	0	0	0	1
Arizona	0	1	1	8	18	10	0	0	0	2	1	0
Utah [2]	1	1	0	20	32	43	0	0	0	0	0	0
Nevada	0	0	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	1	4	3	42	45	52	0	0	0	1	1	1
Oregon	0	0	0	25	20	20	0	0	0	1	0	0
California	12	11	8	86	203	203	0	1	0	2	0	1
Total	96	57	34	2 080	2,383	3,457	3	4	10	38	40	53
Seasonal low week [4]	(11th) Mar. 15–21			(32nd) Aug. 9–15			(35th) Aug. 30–Sept. 5			(11th) Mar. 15–21		
Total since low	24,863	13,394	12,183	28,766	40,954	42,197	57	80	125	3,566	4,291	5,019

[2] Period ended earlier than Saturday.
[4] Including paratyphoid fever reported separately, as follows: Massachusetts 3 (salmonella infection); California 1.

Telegraphic morbidity reports from State health officers for the week ended Jan. 4, 1947, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Whooping cough: Week ended— Jan. 4, 1947	Whooping cough: Week ended— Jan. 5, 1946	Whooping cough: Median 1942-46	Week ended Jan. 4, 1947: Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis, infectious	Rocky Mt. spotted fever	Tularemia	Typhus fever, endemic	Undulant fever
NEW ENGLAND											
Maine	14	19	29	-	-	-	-	-	-	-	2
New Hampshire	-	5	1	-	-	-	-	-	-	-	3
Vermont	4	16	38	-	-	-	-	-	-	-	4
Massachusetts	118	120	129	-	2	-	-	-	-	-	-
Rhode Island	11	19	19	-	-	-	-	-	-	-	-
Connecticut	10	31	73	-	-	-	-	-	-	-	-
MIDDLE ATLANTIC											
New York	166	179	179	9	5	-	1	-	-	-	3
New Jersey	94	91	91	1	-	-	-	-	-	-	-
Pennsylvania	158	94	141	-	-	-	-	-	-	-	1
EAST NORTH CENTRAL											
Ohio	86	71	118	-	-	-	-	-	5	-	-
Indiana	15	12	18	-	-	-	-	1	8	-	2
Illinois	70	47	72	3	-	-	2	-	5	-	1
Michigan [2]	228	18	43	1	4	-	-	-	2	-	1
Wisconsin	134	48	86	-	-	-	-	-	-	-	31
WEST NORTH CENTRAL											
Minnesota	1	8	30	1	-	-	-	-	-	-	-
Iowa	5	6	11	-	-	-	-	-	-	-	12
Missouri	11	7	13	-	-	-	-	-	6	-	2
North Dakota	1	-	1	-	-	-	-	-	-	-	-
South Dakota	1	-	8	-	-	-	-	-	-	-	1
Nebraska	3	5	2	-	-	-	-	-	-	-	-
Kansas	19	17	31	-	-	-	-	-	3	-	1
SOUTH ATLANTIC											
Delaware	4	-	-	-	-	-	-	-	-	-	1
Maryland [3]	40	20	23	-	-	-	1	-	1	-	1
District of Columbia	6	10	10	-	-	-	-	-	1	-	-
Virginia	75	44	46	-	-	29	-	-	2	-	-
West Virginia	10	3	22	-	-	-	-	-	-	-	-
North Carolina	13	26	82	-	-	-	-	-	5	1	-
South Carolina	62	63	63	2	15	-	-	-	2	1	-
Georgia	8	6	11	-	2	-	-	-	-	16	2
Florida	9	1	15	-	-	-	-	-	-	2	-
EAST SOUTH CENTRAL											
Kentucky	46	5	23	-	-	-	-	-	3	-	1
Tennessee	9	11	20	2	-	-	-	-	2	3	1
Alabama	15	4	13	-	-	-	-	-	-	4	2
Mississippi [3]	-	-	-	-	-	-	-	-	-	1	-
WEST SOUTH CENTRAL											
Arkansas	23	3	7	-	-	-	-	-	1	1	1
Louisiana	1	2	2	9	-	-	-	-	-	3	-
Oklahoma	-	5	5	2	-	-	-	-	4	-	2
Texas	139	107	145	6	293	419	-	-	-	5	2
MOUNTAIN											
Montana	1	6	15	-	-	-	-	-	1	-	-
Idaho	5	7	2	-	-	-	-	-	-	-	1
Wyoming	1	-	8	-	-	-	-	-	-	-	-
Colorado	6	23	23	-	-	-	-	-	-	-	-
New Mexico	1	2	3	-	-	-	-	-	-	-	-
Arizona	23	10	21	-	-	25	-	-	-	-	-
Utah [3]	3	12	19	-	-	-	-	-	-	-	-
Nevada	-	1	3	-	-	-	-	-	-	-	-
PACIFIC											
Washington	6	69	51	1	-	-	-	-	-	-	-
Oregon	12	13	18	-	-	-	-	-	-	-	-
California	79	98	149	-	1	-	-	-	-	-	8
Total	1,746	1,373	1,845	37	322	473	4	1	51	37	86
Same week, 1946	-	-	-	37	450	101	6	0	20	67	39
Median, 1942-46	-	-	1,845	14	296	47	6	0	38	67	[4] 47

[3] Period ended earlier than Saturday.
[4] 2-year average, 1945-46.

Anthrax: Ohio 1 case.

WEEKLY REPORTS FROM CITIES [1]

City reports for week ended Dec. 28, 1946

This table lists the reports from 89 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	1	0	------	0	15	1	2	1	6	0	0	------
New Hampshire:												
Concord	0	0	------	0	------	0	0	0	0	0	0	------
Vermont:												
Barre	0	0	------	0	------	0	0	0	0	0	0	1
Massachusetts:												
Boston	11	0	------	1	18	0	14	0	16	0	1	31
Fall River	0	0	------	0	1	0	1	0	1	0	0	4
Springfield	1	0	------	0	------	0	1	0	2	0	0	4
Worcester	0	0	------	0	3	0	10	0	4	0	0	13
Rhode Island:												
Providence	0	0	------	0	2	0	1	0	5	0	0	6
Connecticut:												
Bridgeport	0	0	------	0	------	0	2	0	0	0	0	------
Hartford	0	0	1	0	------	0	1	0	2	0	0	------
New Haven	0	0	------	0	33	0	8	0	3	0	0	------
MIDDLE ATLANTIC												
New York:												
Buffalo	2	0	------	1	------	0	4	0	5	0	0	7
New York	12	1	5	0	22	2	75	8	58	0	0	30
Rochester	0	0	------	1	1	0	4	2	12	0	0	------
Syracuse	0	0	------	0	------	0	4	0	18	0	0	4
New Jersey:												
Camden	0	0	------	0	------	0	3	0	0	0	0	------
Newark	0	0	------	0	1	0	4	0	8	0	0	10
Trenton	0	0	------	0	14	0	3	0	2	0	0	1
Pennsylvania:												
Philadelphia	6	0	6	4	6	2	8	1	18	0	0	28
Pittsburgh	0	0	1	1	208	0	7	0	11	0	0	2
Reading	0	0	------	0	1	0	1	0	0	0	0	5
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	1	0	------	0	------	1	1	0	5	0	1	4
Cleveland	0	0	6	1	129	1	7	0	21	0	0	5
Columbus	0	0	------	0	2	1	1	0	10	0	0	4
Indiana:												
Fort Wayne	0	0	------	0	7	0	5	0	1	0	0	------
Indianapolis	5	0	------	0	------	1	4	0	10	0	0	10
South Bend	0	0	------	0	------	0	0	0	3	0	0	------
Terre Haute	0	0	------	0	------	0	2	0	1	0	0	------
Illinois:												
Chicago	1	0	1	0	9	4	33	1	35	0	0	45
Springfield	0	0	------	0	------	0	2	0	0	0	0	------
Michigan:												
Detroit	1	1	------	0	2	0	13	1	30	0	0	32
Flint	0	0	------	0	------	0	1	1	6	0	0	------
Grand Rapids	0	0	------	0	1	0	2	0	5	0	0	5
Wisconsin:												
Kenosha	0	0	------	0	1	0	0	0	0	0	0	------
Milwaukee	0	0	2	2	------	0	8	0	28	0	0	49
Racine	0	0	------	0	------	0	0	0	0	0	0	8
Superior	0	0	------	0	2	0	0	0	0	0	0	------
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0	------	0	1	0	0	0	0	0	0	------
Minneapolis	3	0	------	2	3	0	4	0	5	0	0	------
St. Paul	0	0	------	0	1	0	6	0	12	0	0	------
Missouri:												
Kansas City	1	0	------	1	1	0	5	0	6	0	1	3
St. Joseph	0	0	------	0	------	0	0	0	0	0	0	2
St. Louis	2	0	------	1	2	1	11	1	8	0	0	5

[1] In some instances the figures include nonresident cases.

City reports for week ended Dec. 28, 1946—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
North Dakota:												
Fargo	0	0		0		0	1	1	2	0	0	
Nebraska:												
Omaha	0	0		0		0	3	0	4	0	0	
Kansas:												
Topeka	1	0		0	1	1	2	0	4	0	0	1
Wichita	0	0	1	0		0	3	0	1	0	0	1
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0		0		0	1	0	3	0	0	6
Maryland:												
Baltimore	6	0	2	0	4	0	4	0	11	0	1	24
Cumberland	0	0		0		0	0	0	0	0	0	
Frederick	0	0		0		0	0	0	0	0	0	
District of Columbia:												
Washington	1	0	1	0	29	0	12	0	10	0	0	4
Virginia:												
Lynchburg	0	0		0		0	0	0	1	0	0	1
Richmond	0	0	1	1	12	0	4	0	2	0	0	
Roanoke	0	0		0		0	0	0	1	0	0	
West Virginia:												
Charleston	0	0		0		0	0	0	2	0	0	
Wheeling	0	0		0		0	1	0	0	0	0	4
North Carolina:												
Raleigh	0	0		0		0	1	0	0	0	0	2
Wilmington	1	0		0		0	0	0	0	0	0	
Winston-Salem	0	0		0	11	0	1	0	2	0	0	
South Carolina:												
Charleston	0	0	17	0	1	0	1	0	0	0	0	
Georgia:												
Atlanta	1	0	1	1	24	0	8	0	1	0	1	4
Brunswick	0	0		0		0	0	0	0	0	0	
Savannah	0	0	2	0	24	0	1	0	0	0	0	
Florida:												
Tampa	0	0	2	0		0	1	0	0	0	0	
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	10	0		0		0	7	0	0	0	0	
Nashville	0	0		1		0	2	0	4	0	0	
Alabama:												
Birmingham	1	0		1	2	0	1	0	4	0	0	1
Mobile	0	0	1	2		0	2	0	0	0	1	
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0		0		0	1	0	0	0	0	
Louisiana:												
New Orleans	14	0	5	1	4	4	2	0	2	0	2	4
Shreveport	0	0		0		0	3	0	0	0	0	
Texas:												
Dallas	0	0		0		0	3	0	2	0	0	2
Galveston	0	0		0		0	0	0	1	0	0	
Houston	0	0		0		0	3	0	0	0	0	1
San Antonio	1	0		0	1	0	4	0	1	0	1	
MOUNTAIN												
Montana:												
Billings	0	0		0		0	2	0	0	0	0	
Great Falls	0	0		0	26	0	1	0	1	0	0	
Helena	0	0		0	2	0	0	0	0	0	0	
Missoula	0	0		0		0	0	0	0	0	0	
Colorado:												
Denver	4	0	4	1	2	0	4	0	14	0	0	4
Pueblo	0	0		0	1	0	2	0	1	0	0	
Utah:												
Salt Lake City	0	0		0	1	0	1	0	7	0	0	

City reports for week ended Dec. 28, 1946—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
PACIFIC												
Washington:												
Seattle	0	0		0	1	0	1	0	5	0	1	
Spokane	0	0	1	0	4	0	1	1	8	0	0	
Tacoma	0	0		0		0	0	0	0	0	0	
California:												
Los Angeles	2	0	7	0	1	0	5	6	12	0	0	15
Sacramento	0	0		0		0	1	0	1	0	0	
San Francisco	2	0	2	0	3	2	4	1	7	0	0	1
Total	91	2	69	23	635	21	347	20	461	0	10	393
Corresponding week, 1945	86		1,203	112	1,042		737		576	0	12	372
Average 1941–45	77		1,639	[2] 156	[3] 1,251		[2] 732		960	0	10	680

[2] 3-year average, 1943–45.
[3] 5-year median, 1941–45.
Anthrax.—Cases: Philadelphia 1.
Dysentery, amebic.—Cases: New York, 2; Chicago, 2; Detroit, 1; St. Louis, 1; San Antonio, 1; Denver, 1.
Dysentery, bacillary.—Cases: Providence, 1; Detroit, 1; Los Angeles, 1.
Dysentery, unspecified.—Cases: San Antonio, 9.
Leprosy.—Cases: New York, 1.
Tularemia.—Cases: Indianapolis, 1; Chicago, 1; St. Louis, 1; Baltimore, 1; Washington, D. C., 2; Lynchburg, 1; Los Angeles, 1.
Typhus fever, endemic.—Cases: Atlanta, 1; Nashville, 2; New Orleans, 10; Los Angeles, 1.

Rates (annual basis) per 100,000 population, by geographic groups, for the 89 cities in the preceding table (estimated population, 1943, 34,369,500)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza Case rates	Influenza Death rates	Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Tyhpoid and paratyphoid fever case rates	Whooping cough case rates
New England	34.0	0.0	2.6	2.6	175	2.6	91.5	2.6	102	0.0	2.6	154
Middle Atlantic	9.3	0.5	5.6	3.2	117	1.9	52.3	2.8	59	0.0	0.0	40
East North Central	4.9	0.6	5.5	1.8	93	4.9	48.0	1.8	91	0.0	0.6	99
West North Central	13.9	0.0	2.0	8.0	18	4.0	69.6	4.0	84	0.0	2.0	24
South Atlantic	14.7	0.0	42.5	3.3	172	0.0	57.2	0.0	54	0.0	3.3	74
East South Central	64.9	0.0	5.9	23.6	12	0.0	70.8	0.0	47	0.0	5.9	6
West South Central	43.0	0.0	14.3	2.9	14	11.5	45.9	0.0	17	0.0	8.6	20
Mountain	33.0	0.0	33.0	8.3	264	0.0	82.6	0.0	190	0.0	0.0	33
Pacific	9.5	0.0	15.8	0.0	14	3.2	19.0	12.7	52	0.0	1.6	25
Total	14.1	0.3	10.5	3.5	97	3.2	52.8	3.0	70	0.0	1.5	60

DEATHS DURING WEEK ENDED DEC. 28, 1946

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Dec. 28, 1946	Corresponding week, 1945
Data for 93 large cities of the United States:		
Total deaths	9,380	11,399
Average for 3 prior years	11,920	
Total deaths, first 52 weeks of year	470,184	471,729
Deaths under 1 year of age	721	602
Average for 3 prior years	657	
Deaths under 1 year of age, first 52 weeks of year	34,936	31,573
Data from industrial insurance companies:		
Policies in force	67,278,078	67,190,360
Number of death claims	9,065	7,789
Death claims per 1,000 policies in force, annual rate	7.0	6.0
Death claims per 1,000 policies, first 52 weeks of year, annual rate	9.3	9.9

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended December 14, 1946.—During the week ended December 14, 1946, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		29	1	204	498	48	36	53	135	1,004
Diphtheria		5	3	23	7	2	2			42
Dysentery:										
Amebic					4					4
Bacillary				1						1
Encephalitis, infectious					1					1
German measles				22	10			8	8	48
Influenza		10			9				2	21
Measles		277	48	80	103	37	442	251	153	1,391
Meningitis, meningococcus				1		1				2
Mumps		1		45	386	42	117	42	200	833
Poliomyelitis		1		9	7		1			18
Scarlet fever		6	3	98	97	9	4	4	16	237
Tuberculosis (all forms)		7	14	100	56	23	9	18	39	266
Typhoid and paratyphoid fever				8	1				3	12
Undulant fever				2						2
Venereal diseases:										
Gonorrhea	3	27	6	164	118	40	32	37	77	504
Syphilis	1	6	2	64	83	13	8	14	35	226
Other forms				1					2	3
Whooping cough		14	1	37	119	12	11	2	5	201

JAMAICA

Notifiable diseases—4 weeks ended December 14, 1946.—During the 4 weeks ended December 14, 1946, cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Cerebrospinal meningitis	1	2	Leprosy		2
Chickenpox		7	Puerperal sepsis		2
Diphtheria	2	5	Tuberculosis (pulmonary)	24	44
Dysentery		4	Typhoid fever	6	95
Erysipelas		1	Typhus fever (murine)	1	

JAPAN

Notifiable diseases—4 weeks ended November 16, 1946, and for the year to date.—For the 4 weeks ended November 16, 1946, and for the year to date, cases of certain notifiable diseases were reported in Japan as follows:

Disease	4 weeks ended Nov. 16, 1946	Total cases reported for the year to date	Disease	4 weeks ended Nov. 16, 1946	Total cases reported for the year to date
Cholera	6	1,204	Paratyphoid fever	634	8,334
Diphtheria	4,702	43,360	Scarlet fever	196	1,809
Dysentery, unspecified	6,859	85,886	Smallpox	36	17,696
Encephalitis, Japanese "B"	8	[1] 172	Syphilis	7,298	62,575
Gonorrhea	12,361	110,476	Typhoid fever	2,666	41,266
Malaria	1,755	[1] 24,848	Typhus fever	66	30,819
Meningitis, epidemic	79	1,359			

For the period June 2, 1946, to date.

NEW ZEALAND

Notifiable diseases—4 weeks ended November 30, 1946.—During the 4 weeks ended November 30, 1946, certain notifiable diseases were reported in New Zealand as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Cerebrospinal meningitis	12	1	Poliomyelitis	1	
Diphtheria	80		Puerperal fever	9	
Dysentery:			Scarlet fever	86	
Amebic	2		Tetanus	1	
Bacillary	5		Trachoma	3	
Erysipelas	15		Tuberculosis (all *forms*)	176	56
Food poisoning	4		Typhoid fever	4	
Lethargic encephalitis	2	1	Undulant fever	6	
Malaria	2				

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Afghanistan—Urgun District—China Khwa.—For the week ended November 23, 1946, 30 cases of cholera with 10 deaths were reported in China Khwa, Urgun District, Afghanistan.

Smallpox

China—Hong Kong.—For the week ended December 21, 1946, 96 cases of smallpox were reported in Hong Kong, China.

Yellow Fever

French Equatorial Africa—Ubangi Shari Department—Carnot.—For the week ended December 21, 1946, 1 death from yellow fever (suspected) was reported in Carnot, Ubangi Shari Department, French Equatorial Africa.

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Public Health Reports

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Public Health Reports

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EXTENDED LABORATORY INVESTIGATIONS ON THE TOXICITY OF DDT RESIDUES TO ADULTS OF *ANOPHELES QUADRIMACULATUS*[1]

By R. W. FAY, *Senior Assistant Sanitarian (R)*, S. W. SIMMONS, *Sanitarian (R)*, and J. M. CLAPP, *Junior Assistant Sanitarian (R)*, *United States Public Health Service*

Investigations of certain factors influencing DDT residual toxicity to adult mosquitoes begun in 1944 were reported in 1945 (*1*). These studies have been continued to determine the effects of prolonged aging on residual deposits. Although the time interval involved in these DDT residual toxicity studies of long duration exceeds the limits of practical control, the studies show trends in the deterioration of DDT deposits which are not truly evident in short-range experiments.

The present paper considers the following points: (1) Modifications in the general testing technique, (2) extension of the previous studies on the relationship between exposure time and mortality, (3) more complete studies on the relationship between dosage and mortality, (4) results obtained from the better solvents in DDT emulsions, and finally, (5) the relative susceptibility of the two sexes of adult *Anopheles quadrimaculatus* mosquitoes to DDT.

GENERAL PROCEDURE

The technique and apparatus used in testing was previously described (*2*) and with the few modifications discussed in this paper have been continued in use for the present results. In brief, 3- to 4-day-old insectary-reared adult *A. quadrimaculatus* mosquitoes of both sexes were employed. The males are more susceptible to DDT than the females, however, and unless indicated, only the results obtained

[1] From Communicable Disease Center, Technical Development Division (Savannah, Ga.), States Relations Division.

with the females will be considered. A test sample, containing at least 20 adult females, was transferred from a stock cage into a glass lantern chimney. It was found advantageous to coat one-half of the chimney with white enamel to form a good background for counting the insects as they flew out of the stock cage. The test sample was then transferred by an air current into an exposure chamber.

The exposure chamber consisted of a wooden framework into which four 3- by 12-inch panels of the test material could be fitted to form a chamber with an exposed treated surface of one square foot on the four sides, and an untreated surface of one-eighth square foot on the two ends. Circular openings, 2⅞ inches in diameter, were cut in each end of the framework and then fitted with removable metal collars, one of which was closed by a metal screen, the other remaining open. The remaining portions of the untreated ends of the exposure chamber were covered with removable paper shields. The end openings were closed by sliding panel doors, a wooden one at the screened end and a metal one at the other. With these precautions, all walls of the exposure chamber were either DDT-treated surfaces or surfaces which could be replaced or adequately cleaned to prevent cumulative contamination from a series of successive tests using the same framework. During the exposure period, the chamber was entirely darkened to minimize any light attraction, and placed on its side, as it was found by repeated observations that mosquitoes would remain on the treated sides in this position. By stringing the four panels together, they could be treated by hand or power sprayers as a single flat surface of 1 square foot.

After a given exposure period the mosquitoes were transferred to an observation cage and the immediate knock-down, the 24-hour, and the 48-hour mortalities were recorded. Control samples were handled in a similar manner, but untreated panels were substituted in the exposure chamber. The percentage of kill was calculated by the formula $\frac{D-E}{T-E}\times 100$, where T was the total number of mosquitoes in the test run, E was the number of dead expected in a control run of size T, and D was the number of dead mosquitoes in the test run.

In presenting the chronological data graphically, a smoothing formula was used as follows: $B'=\frac{A+2B+C}{4}$, in which B' was the corrected point as plotted, A was the reading of the previous period, B was the present reading, and C was the reading of the following period. The symbols A, B, and C represent the average of two or more runs in every case.

RELATIONSHIP BETWEEN EXPOSURE TIME AND MORTALITY

Procedure.—As a basis of comparison the following formula was selected as standard: DDT 35 gm., Triton X–100[2] 4 gm., and xylene to make 100 cc. of spray concentrate. The concentrate was mixed with water so that 4 cc. of diluted spray gave the desired residual deposit, recorded in milligrams of DDT per square foot. These emulsions were sprayed on four sets of panels at rates of 50, 100, 200, and 300 mg. DDT per square foot, and duplicate tests were made on a graded series of exposure periods ranging from 2 minutes to 4 hours. Equal numbers of tests were made on the four residual levels and effective kills were defined by the previously mentioned formula.

Results.—Since comparable tests were run on 50-, 100-, 200-, and 300-mg. dosages for each exposure period, at each selected period after spraying, it was possible (table 1) to present an average picture of DDT residual efficiency over this dosage range and to illustrate the combined mean of the 4 dosage levels graphically (fig. 1).

TABLE 1.—*Percentage mortality at 48 hours of* Anopheles quadrimaculatus *adults after 35-, 60-, 90-, 120-, and 180-minute exposure periods to DDT residues of known age*[1]

Age of residue (in weeks)	35 minutes		60 minutes		90 minutes		120 minutes		180 minutes	
	Mean percentage	Mean standard error	Mean percentage	Mean standard error	Mean percentage	Mean standard error	Mean percentage	Mean standard error	Mean percentage	Mean standard error
0	86	4.3	98	1.4	100	0	100	0	100	0
4	84	3.4	88	3.1	92	3.5	100	0	100	0
8	68	2.9	86	2.5	87	1.8	95	1.7	100	0
12	47	7.8	66	6.7	69	7.5	89	3.1	99	.7
16	38	5.8	57	6.1	69	5.8	87	4.2	96	.9
20	28	4.8	49	6.2	68	4.0	85	5.5	93	2.5
24	37	3.9	60	1.4	78	2.1	88	2.1	94	2.6
28	23	4.9	67	3.8	78	4.6	83	4.7	97	2.6
32	23	10.4	57	4.2	83	5.0	85	1.8	97	.9
36	------	------	53	7.4	72	2.7	77	1.8	91	5.7
40	------	------	54	7.2	59	5.2	69	2.8	90	6.4
44	------	------	57	3.3	66	9.6	73	1.7	93	2.8
48	------	------	64	1.5	75	11.7	82	3.4	96	.7
52	------	------	66	7.3	77	11.6	84	1.8	95	1.2
56	------	------	54	6.4	72	11.9	82	1.7	92	2.9
60	------	------	46	3.4	62	10.8	79	5.4	89	4.9
64	------	------	40	11.7	51	8.1	74	9.2	87	4.6
68	------	------	37	9.8	42	8.9	64	9.8	84	3.9

[1] These data were derived from average kills at 50, 100, 200, and 300 mg. DDT per square foot.

In analyzing the data (table 1) the mean 48-hour mortalities from each of the four residual levels were quite comparable during the first 12 weeks, as shown by their small standard error from the combined mean value, but after 12 weeks the standard error from the mean increased. This was the result of wider variation between the mortalities at the respective residual levels.

[2] An aralkyl-polyether-alcohol emulsifier supplied by the Rohm & Haas Co., Philadelphia, Pa.

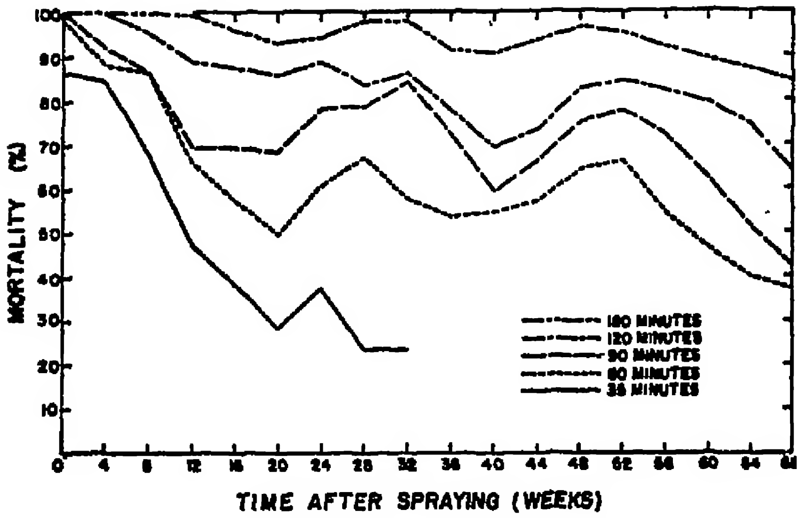

FIGURE 1.—Average 48-hour mortalities of *Anopheles quadrimaculatus* adults after 35-, 60-, 90-, 120-, and 180-minute exposures to DDT residues of 50 to 300 mg. per square foot from ½ to 68 weeks after application.

From the relationship between mortality and exposure time (fig. 1) it is apparent that during the first 6 months after application there is more loss of effectiveness in DDT deposits at a shorter exposure period, i. e., 30 minutes, than at a longer period, i. e., 180 minutes.

In an analysis of the results from the 60-minute exposure period (fig. 2) the mean values from the four residual levels have been plotted and the closest-fitting straight line *A* determined. A chi-square test

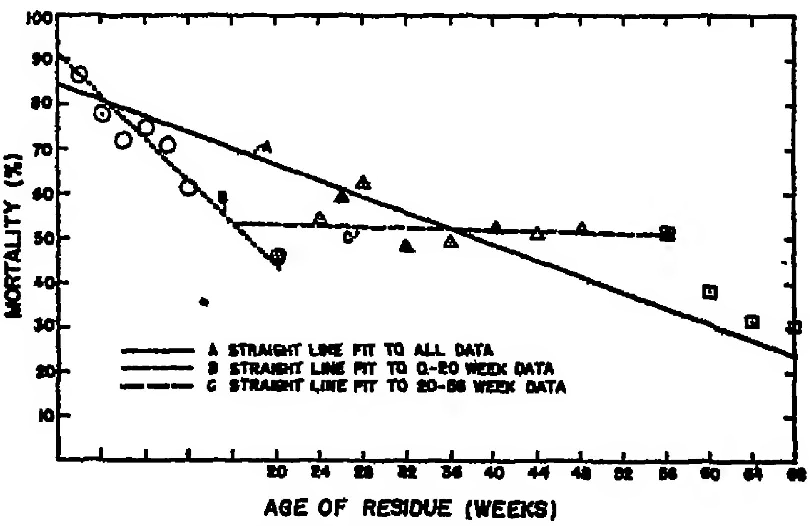

FIGURE 2.—Interpretations of the average 48-hour mortalities of *Anopheles quadrimaculatus* adults after 60-minute exposures to DDT residues of 50 to 300 mg. per square foot from ½ to 68 weeks after application.

of goodness of fit of the data to the line *A* gave a value of 131.157, which indicated a probability of less than 0.01 that the single-line relationship was adequate. The data were then broken into two groups, namely, one formed from residues 0 to 20 weeks old and one formed from residues 20 to 56 weeks old. The closest-fitting straight line was calculated for each datum group. The chi-square value for the line *B* for the data up to 20 weeks of age was 2.038, lying between the

0.95 and 0.50 values of probability, and the line *C* for the data from 20 to 56 weeks had a chi-square value of 7.723, approximating the 0.50 probability level. The two lines, *B* and *C*, intersected at the 16-week point on the graph, and a test of the data from 8 to 36 weeks showed the data to fit this intersecting point better than the closest-fitting straight line over that interval. This analysis might indicate that more than one factor is important in the deterioration of DDT residual deposits.

There are many possible theoretical explanations for the loss in toxicity of DDT residues. Among these may be flaking, chemical deterioration, chemical combination with substrata, absorption, physical occlusion, and perhaps others. Metcalf et al. (*3*) showed that flaking was a factor in the loss of DDT from sprayed surfaces. A certain portion of the DDT penetrates into most absorbent surfaces when applied as an emulsion spray.

Deterioration in effectiveness (fig. 2) terminated after about 16 weeks, followed by a period of almost constant effectiveness for the next 6 months, after which a rapid drop in effectiveness occurred. The surface deposits would be the more susceptible to flaking, and it is possible that a portion of them might be removed by the time the leveling off occurs. In this respect, loss of effectiveness by flaking is plausible. However, the information on DDT toxicity deterioration is too little developed to definitely evaluate the relative importance of the various factors that might be concerned.

Since tests were run at more exposure periods than shown in table 1, a better picture of the relationship between the exposure period and the 48-hour mortalities at ½, 4, 12, 26, 36, 52, and 68 weeks after treatment can be shown in more detail (fig. 3). This graph indicates

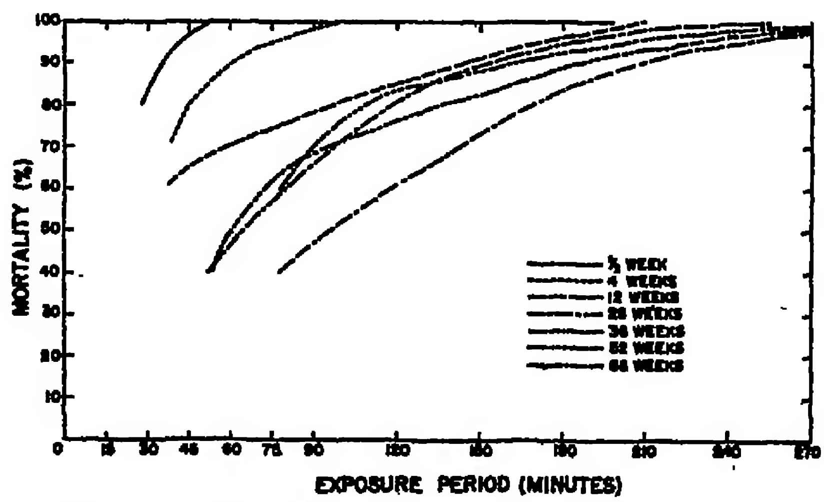

FIGURE 3.—Average 48-hour mortalities of *Anopheles quadrimaculatus* adults in relation to exposure periods ½, 4, 12, 26, 36, 52, and 68 weeks after application of DDT residues of 50 to 300 mg. DDT per square foot.

that the slope of the curve showing the relationship between percentage mortality and the exposure period gradually decreases with the older residual DDT deposits.

RELATIONSHIP BETWEEN DOSAGE AND MORTALITY

Procedure.—To determine the difference in the residual effectiveness of 100 and 200 mg. DDT per square foot, a series of panels was prepared at each concentration, and the adult mosquitoes were exposed to residues of various ages. Average 48-hour mortalities after 60-minute exposures of adult mosquitoes to 100 and 200 mg. DDT per square foot from ½ to 84 weeks after spray applications are shown in table 2.

TABLE 2.—*Percentage mortalities of* Anopheles quadrimaculatus *adults from 60-minute exposures to deposits of 100 and 200 mg. DDT per square foot from a xylene-DDT spray at ½ to 84 weeks after application*

Age of residue (in weeks)	Milligrams DDT per square foot		Age of residue (in weeks)	Milligrams DDT per square foot	
	100	200		100	200
½	95	98	32	44	67
1	95	89	34	58	67
2	92	86	36	50	63
3	86	92	38	52	71
4	85	90	40	36	62
6	82	85	44	57	46
8	84	79	48	58	40
10	79	79	50	49	45
12	80	73	52	54	51
14	77	78	56	53	53
16	69	77	60	53	68
18	71	71	64	52	69
20	72	70	68	44	60
22	65	67	72	37	43
24	51	64	76	37	27
26	58	64	80	24	35
28	52	67	84	12	--------
30	48	70			

The results for the deposits of 200 mg. DDT per square foot (fig. 4) show a fairly rapid rate of deterioration in effectiveness over the first 30 weeks and a slower rate of deterioration from 30 to 70 weeks. The best-fitting straight line has been calculated for each portion of the data. The results for the deposits of 100 mg. DDT per square foot

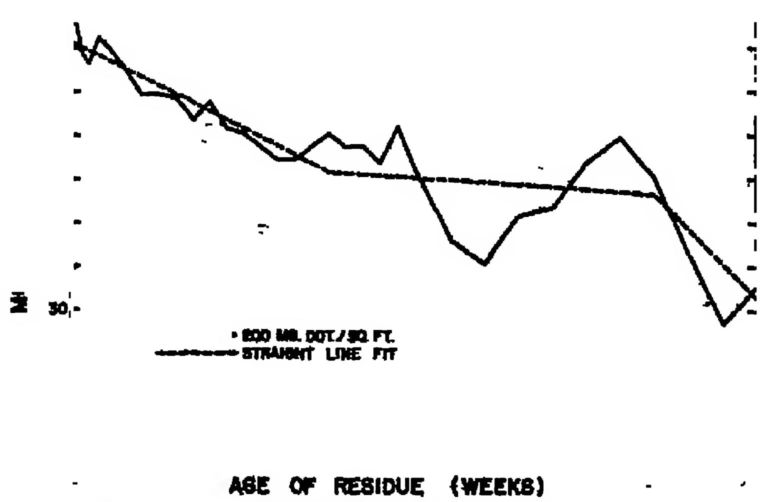

FIGURE 4.—Percentage mortalities of *Anopheles quadrimaculatus* adults 48 hours after 60-minute exposures to residues of 200 mg. DDT per square foot at 1 to 80 weeks after application.

(fig. 5) show approximately the same intervals of deterioration. A comparison of the best-fitting straight lines (fig. 6) for the 100- and 200-mg. dosages indicates that the 200-mg. dosage is appreciably more effective than the 100-mg. dosage. In direct comparison, the 200-mg. dosage after 16 weeks was about equal to the 100-mg. deposits after 12 weeks.

The knock-down rate at the end of the 60-minute exposures shown in comparison to the 48-hour mortalities (table 3) demonstrates that comparative 60-minute knock-down rates were a good indication of relative toxicity.

TABLE 3.—*Percentage knock-down and 48-hour mortality of* A. quadrimaculatus *adults from 60-minute exposures to deposits of 100 and 200 mg. DDT per square foot, from a xylene-DDT spray at 0 to 5 months after application*

Age of residue (in months)	Milligrams DDT per square foot			
	100		200	
	Percentage knock-down	Percentage mortality	Percentage knock-down	Percentage mortality
0	94	100	86	100
1	47	85	81	95
2	55	80	75	90
3	28	75	35	80
4				
5	14	50	35	75

Further investigations on residue concentrations of 25, 50, 100, 200, 300, and 400 mg. DDT per square foot confirmed the previous observations (*1*) that residues of less than 100 mg. DDT per square foot showed inferior residual toxicity for mosquito control. Residues of more than 200 mg. DDT per square foot were not sufficiently better than 200 mg. DDT deposits to be economically feasible.

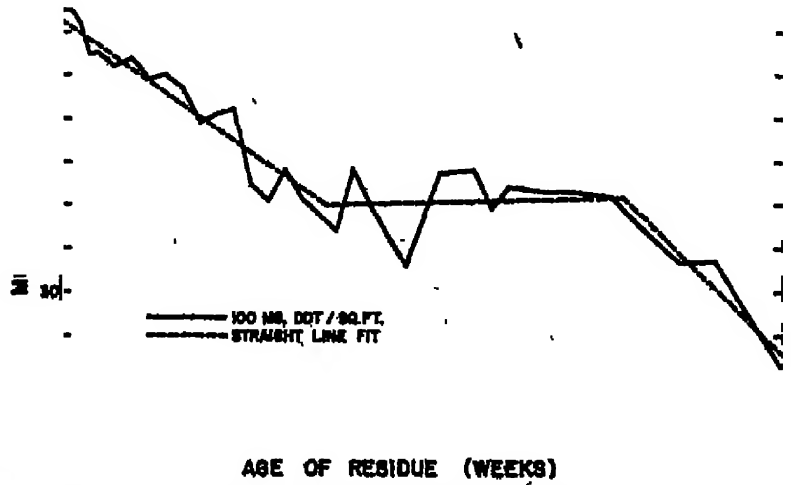

FIGURE 5.—Average 48-hour mortalities of *Anopheles quadrimaculatus* adults after 60-minute exposures to residues of 100 mg. DDT per square foot 1 to 34 weeks after application.

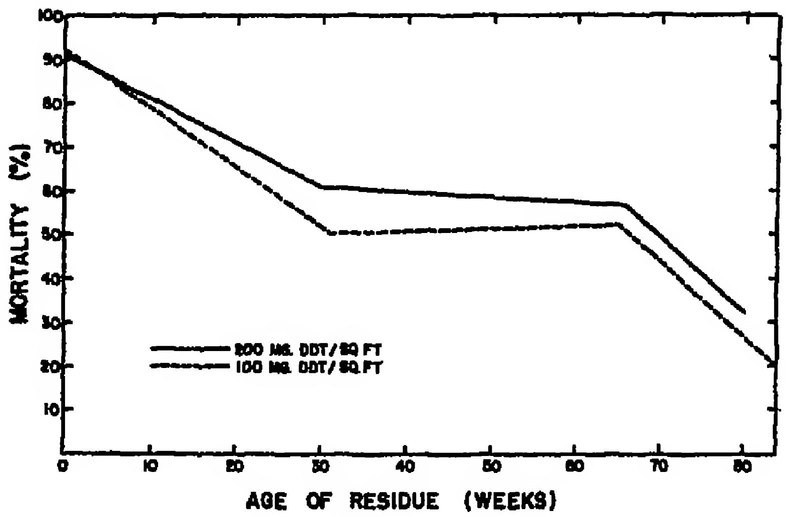

FIGURE 6.—Comparison of the 48-hour mortalities of *Anopheles quadrimaculatus* adults after 60-minute exposures to residues of 100 and 200 mg. DDT per square foot at 1 to 84 weeks after application.

RELATIONSHIP BETWEEN MORTALITIES FROM DDT RESIDUES SECURED FROM VARIOUS SOLVENTS

Procedure.—Preliminary experiments (*1*) were made on a series of DDT solvents in emulsions, and from these solvents five were selected for further testing on the basis of availability, cost, and chemical and physical suitability. A series of panels was sprayed with various solvent-DDT emulsions to give 200 mg. DDT per square foot, and these panels were tested with 30-minute exposures over a period of at least 6 months. The results with these solvents, namely, xylene, kerosene, PD–544C,[3] Solvesso No. 2,[4] and Velsicol AR–50,[5] are given in table 4. In presenting the data graphically (fig. 7), the 2 or 3 best-fitting straight lines for each series of data in table 4 have been plotted.

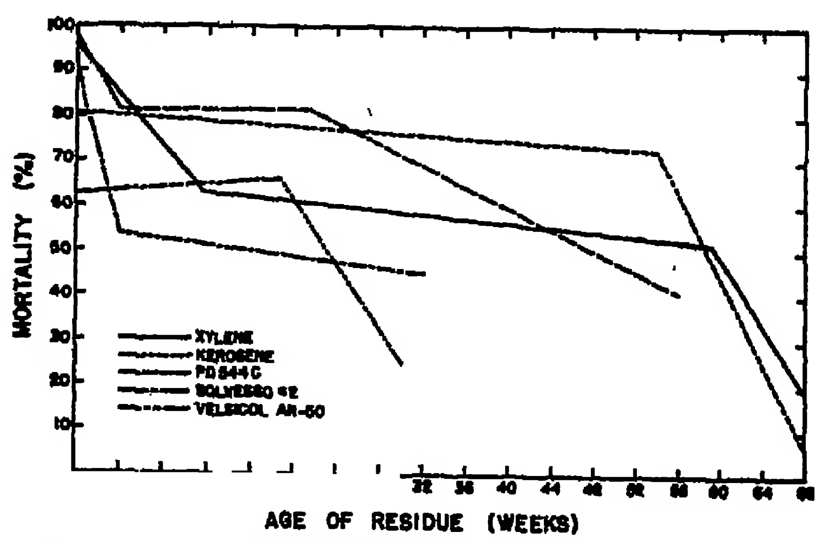

FIGURE 7.—Comparison of the 48-hour mortalities of *Anopheles quadrimaculatus* adults after 30-minute exposures to 200 mg. DDT per square foot from various solvents ½ to 68 weeks after application.

[3] A product of the Socony Vacuum Corp., New York, N. Y.

[4] A product of the Standard Oil Co. of New Jersey, New York, N. Y.

[5] A methylated naphthalene solvent of the Velsicol Co., Chicago, Ill.

It was noted that the xylene curve showed a faster loss of effectiveness during the first 12 weeks than it did from 12 to 60 weeks. The Solvesso No. 2 curve indicates similar rates in loss of effectiveness, and this solvent is quite similar to xylene in its solvent properties and evaporation rate. The slower volatilizing solvents, such as kerosene, PD-544C, and Velsicol AR-50, however, did not show as marked a

TABLE 4.—*Percentage mortalities of* A. quadrimaculatus *adults 48 hours after 30-minutes exposure to 200 mg. DDT per square foot from various solvents 1 to 68 weeks after application*

Age of residue (in weeks)	Percentage mortalities after exposure to DDT residues from different solvents					Age of residue (in weeks)	Percentage mortalities after exposure to DDT residues from different solvents				
	Xylene	Kerosene	PD-544C	Solvesso No. 2	Velsicol AR-50		Xylene	Kerosene	PD-544C	Solvesso No. 2	Velsicol AR-50
1	90	93	92	84	60	28	71	69	88	42	80
2	89	94	91	------	------	32	54	75	67	------	------
3	89	94	86	------	------	36	47	67	51	------	------
4	86	85	80	54	67	40	50	70	48	------	------
6	80	71	80	------	------	44	62	85	57	------	------
8	74	73	86	52	65	48	59	88	59	------	------
10	70	72	83	------	------	52	51	83	50	------	------
12	60	72	------	50	62	54	47	79	44	------	------
14	55	71	------	48	66	56	54	66	39	------	------
16	63	71	71	48	66	58	55	61	------	------	------
18	60	72	71	48	66	60	52	49	------	------	------
20	63	76	83	50	61	62	42	37	------	------	------
22	68	77	87	51	56	64	34	25	------	------	------
24	64	76	89	51	50	66	27	21	------	------	------
26	66	72	92	45	39	68	20	25	------	------	------

loss of effectiveness during the first 12 weeks. As noted in a companion paper on surfaces and DDT,[6] the xylene and Solvesso No. 2-DDT emulsions gave white crystalline deposits on blue enameled surfaces, whereas the kerosene and Velsicol AR-50 did not give appreciable visible deposits. In view of these observations, the solvent used may influence the type of initial deposits, which in turn may affect the residual effectiveness. If the initial loss of effectiveness is due to mechanical loss of flaking of the DDT crystals, as previously suggested, then the effect of the solvent may be due to its influence on the adherence of the crystals to the surface.

Procedure.—To determine the relative susceptibility of the male and female mosquitoes to DDT residues, a series of panels containing 100 mg. DDT per square foot was prepared. Four 30-minute exposures were made and the relative 48-hour mortalities of the two

[6] See p. 166 of companion paper by the same authors: The comparative residual toxicity of DDT to *Anopheles quadrimaculatus* when applied on different surfaces.

sexes were determined (fig. 8). It can be seen that while the residues showed appreciable loss of toxicity for the females, there was little difference in the male mortalities even after 42 weeks. These runs were paralleled with controls to determine natural mortalities for each sex.

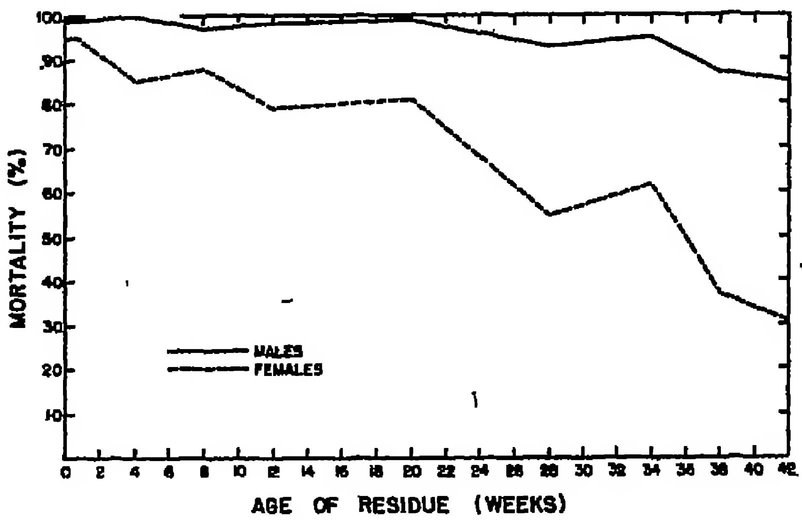

FIGURE 8.—Average 48-hour mortalities of *Anopheles quadrimaculatus* males and females after 60-minute exposures to residues of 100 mg. DDT per square foot at 1 to 42 weeks after application.

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THE COMPARATIVE RESIDUAL TOXICITY OF DDT TO *ANOPHELES QUADRIMACULATUS* WHEN APPLIED ON DIFFERENT SURFACES [1]

By J. M. CLAPP, *Junior Assistant Sanitarian (R)*, R. W. FAY, *Senior Assistant Sanitarian (R)*, and S. W. SIMMONS, *Sanitarian (R)*, *United States Public Health Service*

Subsequent to initiation of the extended malaria-control program by the United States Public Health Service, many types of households in various sections of the country were sprayed with DDT. In the treatment of premises, surfaces were encountered which varied from those of household walls and furnishings to those of outbuildings and barns. The precautions against damage to surfaces varied considerably according to the surface treated. Since the success of the

[1] From Communicable Disease Center, Technical Development Division (Savannah, Ga.), States Relations Division.

control program and the future practical field use of DDT in homes depended upon the satisfaction of the householder, knowledge concerning the residual effect of DDT treatments on different surfaces, the precautions necessary in application, and the amount of spray required for effective mosquito control was essential.

For the afore-mentioned reasons, investigations at the Henry R. Carter Memorial Laboratory were initiated to determine the following factors: (1) the comparative residual toxicity of DDT sprayed on different materials; (2) the effects of spray applications on different surfaces; and (3) the effect of surface on the final residue distribution.

GENERAL PROCEDURE

Insectary-reared adult *Anopheles quadrimaculatus* mosquitoes, of both sexes, were used in the laboratory tests, but, because the males are more susceptible to DDT, only the mortalities of the females have been considered in this paper. The technique employed has been described previously (*1*). In brief, a sample of approximately 25 females, 3 to 4 days old, was transferred from a stock cage to a glass-lantern chimney and then by an air current into an exposure chamber. The chamber consisted of a wooden framework into which were inserted four 3- by 12-inch panels of the surface to be tested. Prior to testing, the panels had been sprayed by hand or power sprayers as a single flat surface of 1 square foot. After a determined exposure period, the mosquitoes were gently blown into an observation cage by means of an air current and the immediate knock-down, the 24- and the 48-hour mortalities were recorded. In control tests, untreated wooden panels were substituted in the exposure chamber, and the mosquitoes were handled according to the above procedure. Any natural mortality in the controls was evaluated and included in the presentation of results. The percentage of kill was calculated by the formula $\frac{D-E}{T-E}\times 100$, in which T was the total number of mosquitoes in the test sample, E was the number of dead expected in a control run of size T, and D was the number of dead mosquitoes in the test sample.

In presenting the data graphically, a smoothing formula was used as follows: $B'=\frac{A+2B+C}{4}$ in which B' was the corrected point as plotted, A was the reading of the previous period, B was the reading to be corrected, and C was the reading of the following period. In every case, the symbols A, B, and C represented the average of two or more runs.

THE COMPARATIVE RESIDUAL TOXICITY OF DDT SPRAYED ON DIFFERENT MATERIALS

It was thought that the permeability of the surface, the type of surface finish, and the subsurface material might influence the residual toxicity of DDT sprays. Therefore, in order to determine the comparative toxicity of equal amounts of DDT applied to different materials, several series of panels, selected to represent the more typical surfaces encountered in premise spraying, were treated with a 5-percent DDT-xylene emulsion at a rate of 200 mg. DDT per square foot. Duplicate tests, at both 30- and 60-minute exposure periods, were made at two-week intervals after the original spray application. In general, tests were continued until resultant mortalities were well below practical consideration.

To prepare the 5-percent DDT-xylene emulsion, the standard selected for comparison, a 35-percent DDT-xylene-Triton X–100 [2] concentrate was diluted with six parts of water.

Sets of test panels were prepared from the following materials: fabrics, represented by mohair upholstery, drapery or slip-cover goods, tent canvas, and window-shade material; painted surfaces, typified by well-weathered gray enamel, black exterior flat paint, cream interior gloss enamel, spar varnish, rubbing or furniture varnish, and casein water paint; and other frequently encountered surfaces, such as wall-paper, fiberboard, whitewash, plastic screen, linoleum, and simulated adobe.

In panel preparation, field conditions were closely duplicated because the subsurface and surface materials, as well as the conditions of spray application, were considered to be determining factors in DDT residual toxicity. Bearing these factors in mind, plastic screen and fabrics were sprayed on a frame to duplicate window screens and drapes, through which, in normal house spraying, much of a liquid spray passes. After thorough drying, the test materials were mounted on plywood panels.

For the preparation of the paints and varnishes, both the subsurface material and the drying time were taken into account. Whitewash was applied to rough wood similar to that found in barns. Finished oak and dressed pine, exemplifying flooring and framing material, were used as a typical backing for the varnishes and paints, respectively. Two coats each of spar varnish, rubbing varnish, interior enamel, and flat paint were applied to three sets of panels. One set of each type was treated with DDT 1 week after the second-coat

[2] A proprietary emulsifier made by Rohm & Haas Co., Philadelphia, Pa.

application; one set after 4 weeks; and one set after 17 weeks. For comparison, enamel, which had weathered for 3 years, was tested.

Casein water paint required a subsurface typical of interior walls. For this purpose, plaster blocks (3- by 12- by ½-inch) were prepared in molds. After drying a month these blocks were glued to plywood panels, after which two coats of casein water paint were applied to the untreated plaster. One week later the panels were sprayed with DDT. Similar plaster blocks were also used as a base for wallpaper. For this purpose, however, the dried blocks were sized before pasting on the wallpaper with flour paste. Various colors, grades, and textures of wallpaper were tested.

In order to simulate adobe, alluvial clay, which had been silted by natural tidal action on pilings, was used, after screening to remove extraneous matter. A clay slurry was poured into molds large enough to allow for a predetermined shrinkage, dried for 2 months at room temperature, and then the clay blocks were backed with plywood.

The fiberboard and linoleum required no special preparation and were, consequently, merely cut into panels of the correct size and sprayed.

For the purpose of comparing the residual toxicity of equal amounts of spray applied to different materials, the 48-hour mortality from a 60-minute exposure to a deposit of 200 mg. DDT per square foot on plain pine plywood panels was adopted as a standard. This standard was selected because plywood is fairly uniform in composition and easily handled, and because it had served as standard test material in previous laboratory work on DDT residues (*2*).

From the results obtained, the materials were divided into three groups: Those materials with residual toxicity equal to or better than the standard; those with residual toxicity one-half to three-fourths as effective; and those with residual toxicity less than one-half as effective as the standard.

Results equal or better than standard were obtained from the application of DDT emulsion to the fabrics (mohair, canvas, cotton goods, and window-shade material), to wallpaper, and to the rubbing varnishes which had dried for at least 1 month prior to the spray application. The data for each type of material are presented separately in table 1, and all results on the various fabrics have been plotted as a single curve, for comparison with the other surfaces, in figure 1.

The DDT residues on rubbing varnish (10-day drying period), casein water paint, weathered gloss enamel, fiberboard, and wire screen were one-half to three-fourths as effective as the standard. The results obtained from fresh rubbing varnish, water paint, and weathered enamel were almost identical and therefore have been

TABLE 1.—*Percentage mortality at 48 hours of* Anopheles quadrimaculatus *adults after 60-minute exposure periods to deposits of 200 mg. DDT per square foot of known age on different types of surface materials*

Age of residue (in weeks)	Type of surface material						
	Standard pine plywood	Fabrics				Rubbing varnish	Wall-paper
		Mohair	Cotton	Canvas	Window shade		
2	86	100	97	100	99	95	97
4	96	97	95	99	99	93	98
6	94	92	92	98	96	92	96
8	91	90	89	97	89	91	86
10	82	75	89	95	86	91	79
12	70	58	88	92	91	91	82
14	66	72	87	88	97	89	89
16	62	89	93	84	88	89	89
18	58	92	78	82	70	83	89
20	54	94	59	78	62	81	82
22	59	85	47	62	58	78	75
24	62	68	56	49	56	85	69
26	63	54	57	45	61	----------	70
28	67	42	43	49	56	----------	70
30	63	39	39	56	40	----------	67
32	59	39	33	55	----------	----------	61

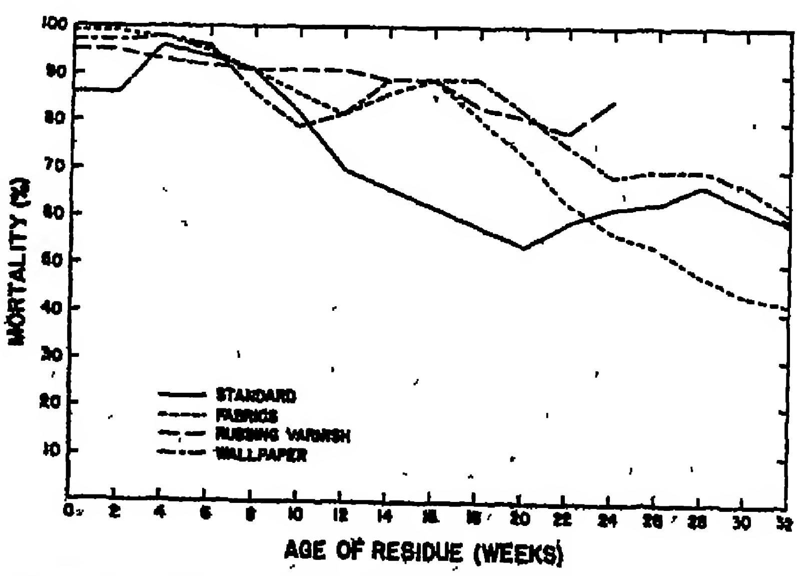

FIGURE 1.—Percentage mortalities at 48 hours of *Anopheles quadrimaculatus* adults after 60-minute exposures to residues of 200 mg. DDT per square foot of known age on different types of surfaces.

plotted as a single curve in figure 2. The results for each type of material are presented in tabular form in table 2.

In comparison with the standard, results showing one-half or less the effectiveness were secured from surfaces treated with whitewash, spar varnish, and with gloss and flat paints which had dried 1 to 17 weeks previous to spray application. Very little residual toxicity was obtained from linoleum and practically none from the adobe-like panels. The data for each type material are presented separately in table 3, but the results on the gloss and flat paints have been plotted as a single curve in figure 3, for comparison.

TABLE 2.—*Percentage mortality at 48 hours of* Anopheles quadrimaculatus *adults after 60-minute exposure periods to deposits of 200 mg. DDT per square foot of known age on different types of surface materials*

Age of residue (in weeks)	Type of surface material: Standard pine plywood	Fresh rubbing varnish	Casein water paint	Old paint	Fiber-board	Wire screen
2	86	97	76	97	91	73
4	96	97	75	97	90	80
6	94	95	64	95	85	82
8	91	88	43	79	83	76
10	82	80	36	59	83	75
12	70	79	54	63	78	77
14	66	85	72	80	77	81
16	62	89	73	87	77	80
18	58	78	59	66	56	71
20	54	50	42	28	29	62
22	59	27	33	15	23	54
24	62	21	28	17	31	48
26	63	30	18	11	26	52
28	67	42	20	6	27	56
30	68	46	18	4	29	49
32	59	42	22	----------	21	----------

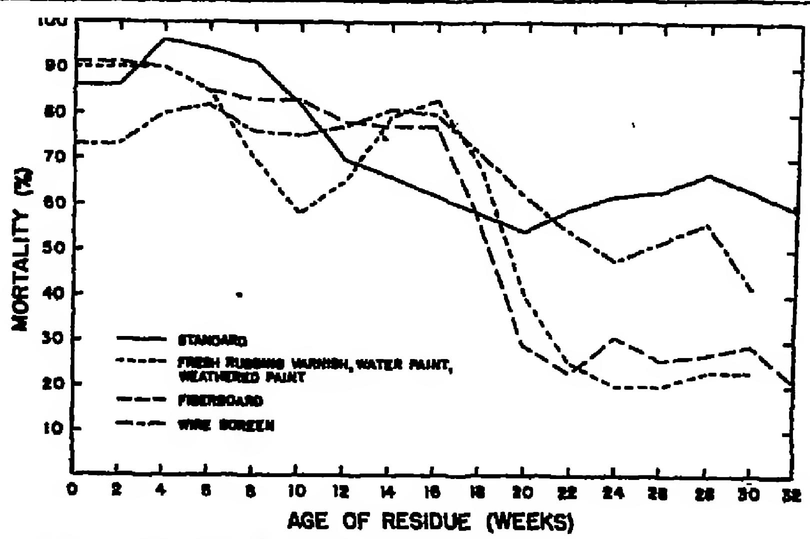

FIGURE 2.—Percentage mortalities at 48 hours of *Anopheles quadrimaculatus* adults after 60-minute exposures to residues of 200 mg. DDT per square foot of known age on different types of surfaces.

TABLE 3.—*Percentage mortality at 48 hours of* Anopheles quadrimaculatus *adults after 60-minute exposure periods to deposits of 200 mg. DDT per square foot of known age on different types of surface materials*

Age of residue (in weeks)	Type of surface material: Standard pine plywood	White-wash	Spar varnish	Cream inside enamel	Black outside paint	Linoleum	Mud
2	86	61	72	37	38	27	8
4	96	50	75	39	44	12	0
6	94	47	70	35	35	8	----------
8	91	55	65	21	25	2	----------
10	82	53	57	14	26	----------	----------
12	70	52	48	16	24	----------	----------
14	66	59	49	15	32	----------	----------
16	62	51	50	15	25	----------	----------
18	58	23	38	12	16	----------	----------
20	54	6	20	10	15	----------	----------
22	59	8	15	9	14	----------	----------
24	62	14	15	3	12	----------	----------
26	63	15	14	2	17	----------	----------
28	67	16	12	5	14	----------	----------
30	68	----------	10	----------	7	----------	----------

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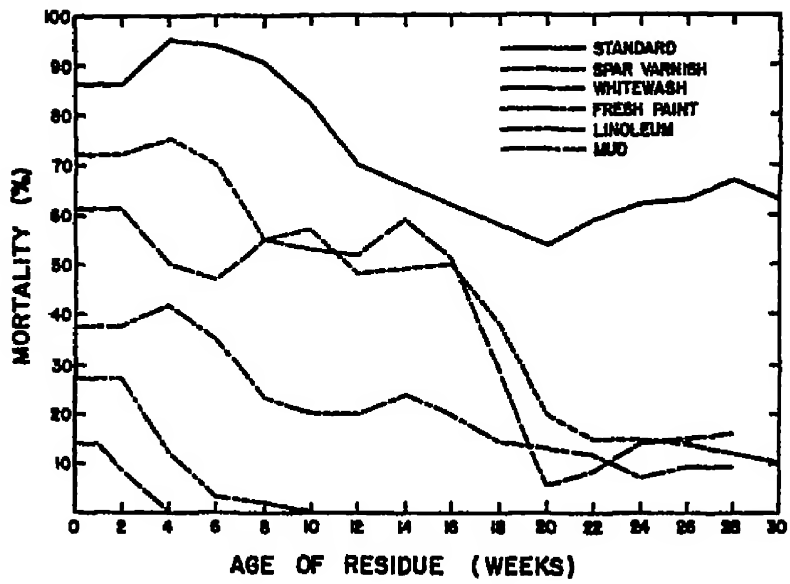

FIGURE 3.—Percentage mortalities at 48 hours of *Anopheles quadrimaculatus* adults after 60-minute exposures to residues of 200 mg. DDT per square foot of known age on different types of surfaces.

Since the mud panels gave no residual toxicity with the application of 200 mg. DDT per square foot, a series of tests was run to determine if this could be overcome by heavier applications. Additional sets of mud panels were sprayed at the rate of 400 and 600 mg. DDT per square foot. From the results as shown in table 4 and figure 4, it was concluded that DDT in emulsion form could not be applied to mud surfaces for effective control, although it is feasible that other types of mud, some method of sizing the surface, or other means of applying DDT might give better results.

TABLE 4.—*Percentage mortalities at 48 hours of* Anopheles quadrimaculatus *adults after 60-minute exposures to residues of 200, 400, and 600 mg. DDT per square foot of known age on simulated adobe mud surfaces*

Age of residue (in weeks)	Standard pine plywood	Milligrams DDT per square foot on simulated adobe				Age of residue (in weeks)	Standard pine plywood	Milligrams DDT per square foot on simulated adobe			
		200	200	400	600			200	200	400	600
1	100	14	----	----	----	8	91	----	----	----	14
2	86	7	9	27	36	10	82	----	----	----	11
4	96	0	0	14	25	12	70	----	----	----	0
6	94	----	----	0	18						

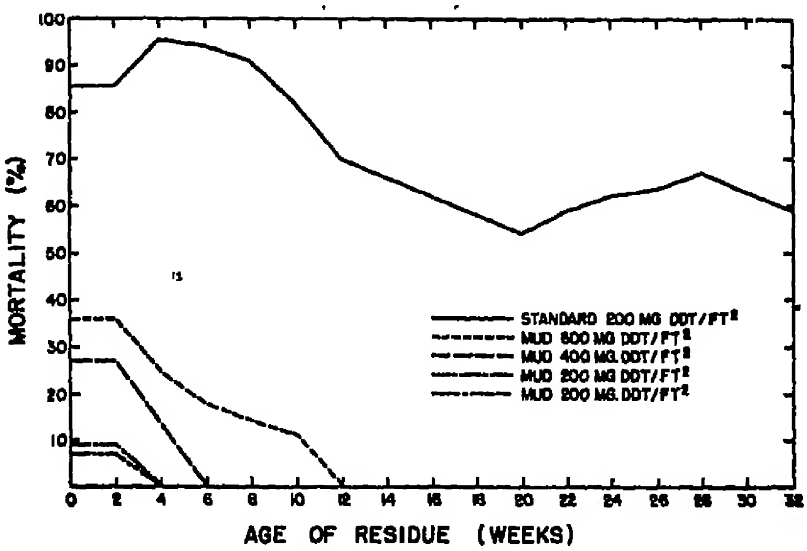

FIGURE 4.—Percentage mortalities at 48 hours of *Anopheles quadrimaculatus* adults after 60-minute exposures to residues of 200, 400, and 600 mg. DDT per square foot of known age on simulated adobe mud surfaces.

THE EFFECTS OF SPRAY APPLICATION ON DIFFERENT SURFACES

When a 5-percent DDT-xylene emulsion was applied at the rate of 4 cc. or 200 mg. DDT per square foot, the visibility of the deposits varied with the type of surface. Although the residual toxicity was good on discontinuous or extremely irregular surfaces such as fabrics, whitewash, plastic screen, plaster, fiberboard, and wallpaper, the DDT deposits were scarcely visible and caused no marked discoloration even on dark-colored mohair fabrics. In addition, no visible damage from the residue was detected on linoleum or on flat paint surfaces.

It was found that with overapplication of the spray on certain surfaces, the DDT deposits caused some damage by solvent action. For example, if too much liquid was applied to wallpaper, the paper was permanently discolored wherever runs developed. This damage was especially evident on certain blue and green papers. When applied to glass, the DDT crystals were clearly visible, but they could be removed by vigorous rubbing or by the use of a suitable solvent. On high-gloss enamels the application of the emulsion caused some clouding of the gloss, but in uniform applications this was not especially noticeable. The same was true of rubbing-varnish surfaces, but spar varnishes showed a persistent discoloration. This damage could not be removed.

On certain dark-blue and dark-green gloss enamels, the 5-percent emulsion produced an unsightly white deposit, and an effort was made to determine the source of this damage. Two series, containing nine test blocks each, were prepared with two coats of enamel. One series was allowed to dry for 10 days, the other for 30 days. Both series

were sprayed with the following preparations: (1) A concentrate of 35 gm. DDT, 4 gm. Triton X-100, and xylene to make 100 cc., diluted with six parts of water to give a 5-percent emulsion; (2) the same formula as (1) with the substitution of Arctic Syntex A[3] for Triton X-100; (3) the same formula as (1) with the substitution of Velsicol AR-50 (Special)[4] for xylene; (4) the same formula as (1) with the substitution of Solvesso No. 2 [5] for xylene; (5) the same formula as (1) with the omission of DDT; (6) a 5-percent DDT-kerosene solution; (7) xylene; (8) kerosene; (9) water. In the series, the DDT crystals seemed to be the source of the white deposit, and the nature of the deposit was related to the solvent because it occurred only when fast volatilizing solvents, such as xylene and Solvesso No. 2, were employed. The deposit did not appear when kerosene or Velsicol was substituted as a solvent. The observations on both series were comparable. Therefore, the age of the enamel did not influence the type of deposit.

Inasmuch as the DDT-kerosene and DDT-Velsicol mixtures did not produce the white deposit typical of DDT-xylene sprays, the blocks from each combination were tested to determine the residual toxicity to adults of *A. quadrimaculatus*. Since the mortalities were of the same order of magnitude in preliminary tests, it was concluded that DDT must have been present on all the surfaces, but not always as a perceptible white deposit.

THE EFFECT OF SURFACE ON THE FINAL RESIDUE DISTRIBUTION

As evidenced by tests, the nature of the surface material influenced the final distribution of the DDT deposits and their resultant toxicity. In order to ascertain the penetration of the emulsion into dressed wood, a series of white-pine panels was planed so that the surface to be sprayed was uniform. After an application of 200 mg. DDT per square foot the panels were tested at 60-minute exposures, and the subsequent mortalities were recorded. One hundredth of an inch was planed off the surface and the panels again tested. This process was continued until no residual toxicity was noted. The 48-hour mortalities were as follows: Surface mortality, 95 percent; 0.01 inch below the surface, 45 percent; 0.02 inch below the surface, 10 percent; 0.03 inch below the surface, 3 percent; and 0.04 inch below the surface, 0 percent.

The rubbing- or furniture-varnish panels, well dried before spray application, gave a longer residual effect than freshly painted or varnished surfaces; that is, those with a drying period of less than 1 month. Casein water paint showed very little initial loss of toxicity,

[3] Arctic Syntex A, a product of the Colgate Palmolive Peet Co., Jersey City, N. J.
[4] Velsicol, a product of the Velsicol Co., Chicago, Ill.
[5] Solvesso No. 2, a product of the Standard Oil Co. of New Jersey, New York, N. Y.

and no initial loss of toxicity was noted on well-weathered painted surfaces.

The high effectiveness of the DDT-impregnated fabrics may demonstrate that the surface of the material acted as a filter for the deposition of the DDT particles. The ineffectiveness obtained with sprayed linoleum may be attributed to the dissolution of the DDT crystals by the oils present in the linoleum. Thus, most of the spray may have been absorbed and the DDT deposited under the surface. In all probability, the simulated adobe surfaces retained no residue because the spray was immediately absorbed, thereby leaving a minimum of DDT crystals on the surface.

In field tests, certain whitewashed barns treated with DDT spray were found to give a longer residual effect than others treated with the same dosage of DDT. In order to determine the source of the variations in results and the applicability of DDT sprays to whitewashed surfaces, four formulas were made and tested as follows:

(1) ½ lb. lime, 400 cc. water.

(2) ½ lb. lime, ½ oz. salt, 400 cc. water.

(3) ½ lb. expended calcium carbide, 400 cc. water.

(4) ½ lb. expended calcium carbide, ½ oz. salt, 400 cc. water.

Two coats of whitewash were applied to each set of rough wood panels and allowed to dry thoroughly before being sprayed with the standard emulsion at the rate of 200 mg. DDT per square foot.

In addition to the above formulas, DDT was incorporated in lime- and calcium-carbide-base whitewashes and then applied to test panels. Formulas were made so that a two-coat application contained 800 mg. DDT per square foot.

The lime whitewash produced a bright, white finish even when wet, but the calcium-carbide whitewash was gray and did not acquire a bright white until thoroughly dry. The preparations containing salt adhered better than those without salt, and on days of high humidity they presented a moist surface, in contrast to the dry surface of the salt-free preparations.

Preliminary tests indicated that the formulas with salt as a component gave a 15- to 25-percent higher kill than those without salt. The whitewash, incorporated with enough DDT to contain approximately 800 mg. per square foot, gave mortalities 10 to 20 percent better than those secured with an application of spray emulsion of 200 mg. DDT per square foot to dry whitewash. The results for lime- and calcium-carbide-base whitewash, as shown separately in table 5, gave such similar results that they were combined in figure 5 into four curves representing mortality data from whitewashed surfaces sprayed with DDT, both with and without salt, and whitewash containing DDT, both with and without salt.

TABLE 5.—*Percentage mortality at 48 hours of* A. quadrimaculatus *adults after 60-minute exposure periods to residues of 200 mg. DDT per square foot of known age either sprayed on or incorporated in whitewash and salt surfaces*

Age of residue (in weeks)	DDT spray on whitewash (200 milligrams per square foot)				DDT in whitewash (800 milligrams per square foot)		
	Lime	Carbide	Lime salt	Carbide salt	Lime	Carbide	Carbide salt
1	86	58	95	89	75	68	88
2	85	68	98	85	79	71	88
4	72	45	83	73	85	75	88
8	68	55	82	83	79	67	82
10	60	50	80	83	76	64	81
12	56	48	74	78	72	67	80
14	42	40	68	66	65	65	76
16	22	26	68	56	60	64	63
18	16	21	62	50	56	54	39
20	---	---	---	---	42	31	19

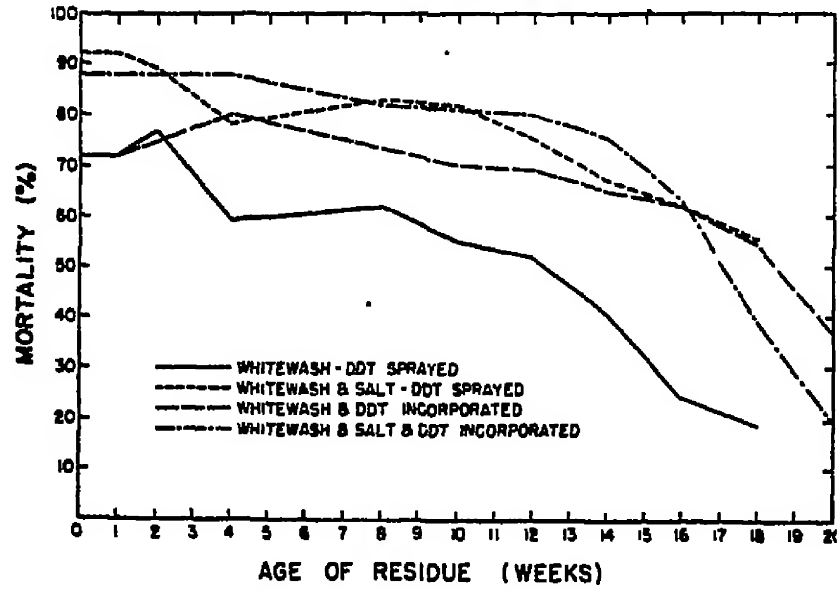

FIGURE 5.—Percentage mortality at 48 hours of *Anopheles quadrimaculatus* adults after 60-minute exposure periods to residues of 200 mg. DDT per square foot of known age sprayed on or incorporated in whitewash and salt surfaces.

Tests were also conducted to determine the effect of kitchen-grease deposits on the residual toxicity of DDT. Two sets of standard, unpainted, dressed-wood panels were placed on the walls of each of four houses and were thereby treated as an integral part of the walls during the spray application. One set of panels was returned to the laboratory, and the individual panels of the other set were mounted in various places on the kitchen walls, where they remained, except for short test periods in the laboratory. The DDT deposits in the four houses ranged from 106 to 427 mg. DDT per square foot.

Over a period of 36 weeks the study indicated, as shown in figure 6, that the grease deposits on kitchen walls of ordinary households caused an average of 8.27±4.50-percent loss in DDT toxicity beyond that occurring from natural aging. This effect might be augmented

in commercial kitchens in which heavier grease deposits would be expected. The results from the individual houses are presented in tabular form in table 6.

TABLE 6.—*Percentage mortality at 48 hours of* A. quadrimaculatus *adults after 60-minute exposure periods to DDT residues of known age subject to grease deposition*

Age of residue (in weeks)	House	Laboratory	House	Laboratory	House	Laboratory	House	Laboratory
4	92	97	89	99	85	94	91	99
6	92	94	78	99	76	86	84	92
8	85	92	67	99	69	77	78	78
10	74	86	76	96	74	83	69	75
12	75	78	84	91	76	75	58	79
16	85	75	79	92	70	47	52	75
20	90	76	69	93	74	48	57	69
22	79	68	56	87	76	65	56	60
24	56	54	45	74	58	62	42	47
26	46	56	39	65	41	51	35	48
28	48	62	42	69	39	45	46	50
30	48	55	48	74	40	48	50	44
32	46	50	48	65	39	53	39	31
34	---	---	44	50	27	49	28	28
36	---	---	41	48	18	42	26	28

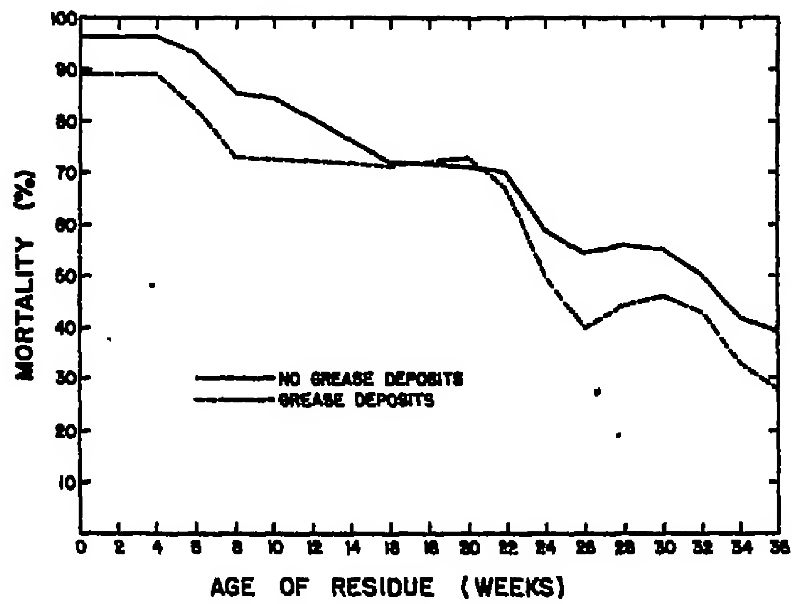

FIGURE 6.—Percentage mortality at 48 hours of *Anopheles quadrimaculatus* adults after 60-minute exposure periods to DDT residues of known age subject to grease deposition.

SUMMARY AND CONCLUSIONS

It has been ascertained that the relationships between various types of household wall surfaces and the residual toxicity of DDT deposits are important factors in the practical use of DDT sprays.

The type of surface influences the residual toxicity of DDT sprays applied at equal rates. DDT on rough wood, fabrics, well-dried paints, and rubbing varnish gives the best residual effect. DDT spray applications on linoleum, fresh paints, spar vanish, or on simu-

lated adobe are not effective against *A. quadrimaculatus* under test conditions. Under the conditions described, even applications of 600 mg. DDT per square foot are ineffective on adobe.

DDT sprays do not damage plastic screen or fabrics which are composed of plant or animal fibers. If applied too heavily, they cause some clouding of high-gloss enamels and some staining of wallpaper. DDT sprays, with either kerosene or Velsicol AR–50 as solvents, produce less deleterious effects on dark-gloss enamels than do the DDT-xylene emulsions.

The nature of the surface definitely affects the final distribution of the DDT deposits. Fabrics, wallpaper, and rough wood tend to hold the crystals on the surface, whereas plain, smooth wood is penetrated by the spray and a considerable portion of the spray deposit remains beneath the surface. Linoleum, fresh paints, and varnishes are readily penetrated by the solvents, and some of the DDT crystals are thereby permanently or temporarily occluded. The incorporation of salt into whitewash produces more effective DDT residual deposits on the outer surface of the whitewash. Grease or smoke depositions on surfaces previously treated with DDT decrease the efficiency of the residues.

REFERENCES

(*1*) Simmons, S. W., and staff: Techniques and apparatus used in experimental studies of DDT as an insecticide for mosquitoes. Pub. Health Rep., Supplement No. 186, pp. 3–20 (1945).

(*2*) Fay, R. W.; Simmons, S. W.; and Clapp, J. M.: Laboratory investigations on the toxicity of DDT residues to adults of *Anopheles quadrimaculatus*. Pub. Health Rep., Supplement No. 186, pp. 21–34 (1945).

DEATHS DURING WEEK ENDED JAN. 4, 1947

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Jan. 4, 1947	Corresponding week, 1946
Data for 93 large cities of the United States:		
Total deaths	10,209	11,928
Median for 3 prior years	11,928	
Deaths under 1 year of age	814	844
Median for 3 prior years	844	
Data from industrial insurance companies:		
Policies in force	67,259,940	67,179,698
Number of death claims	10,044	10,576
Death claims per 1,000 policies in force, annual rate	7.8	8.2

INCIDENCE OF DISEASE

No health department, State, or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JANUARY 11, 1947

Summary

A total of 4,728 cases of influenza was reported for the current week, as compared with 3,665 last week and a 5-year (1942–46) median of 4,330. Increased incidence was reported in only 3 of the 9 geographic divisions, namely, the Middle Atlantic, West North Central, and West South Central. Four States (Virginia, South Carolina, Texas, and Arizona) reported 81 percent of the total, and the increase in Texas accounted for 966 of the total net increase of 1,063 cases. Only 4 States reported more than 180 cases, and only 5 other States more than 50 cases. These States are as follows (last week's figures in parentheses): *Increases.*—Kansas 86 (36), West Virginia 98 (65), Arkansas 144 (53), Oklahoma 97 (90), Texas 2,397 (1,431); *decreases*—Virginia 504 (615), South Carolina 774 (789), Alabama 51 (69), Arizona 181 (209). The total to date since seasonal low (July 28, 1946) is 41,368, as compared with 442,924 for the same period last year and a median of 43,556 for the corresponding periods of the past 5 years.

A total of 91 cases of poliomyelitis was reported for the week, as compared with 96 last week and a 5-year median of 32. Only 5 States reported more than 4 cases each—California 19, Indiana, Texas and Idaho 7 each, and Kansas 5. The total since seasonal low (March 16, 1946) is 24,955 cases, as compared with 13,448 and 19,093 for the corresponding periods of the past 2 years, respectively, and a 5-year median for the period of 12,165.

The incidence of measles increased during the week in all of the 9 geographic divisions except the East South Central. Of the net increase of 1,220 cases (2,995 to 4,215), a combined increase of 813 cases was reported in the New England and Middle Atlantic areas. Corresponding week last year, 5,314 cases.

Increased incidence of scarlet fever (2,080 to 2,336), the largest increase (114 cases), in the Middle Atlantic area, was reported in all geographic areas except the New England and East North Central. Corresponding week last year, 2,722 cases.

A total of 10,638 deaths was recorded for the week in 93 large cities of the United States, as compared with 10,209 last week, 11,670 and 9,912, respectively, for the corresponding weeks of 1946 and 1945, and a 3-year (1944–46) median of 11,659.

Telegraphic morbidity reports from State health officers for the week ended Jan. 11, 1947, and comparison with corresponding week of 1946 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46
	Jan. 11, 1947	Jan. 12, 1946		Jan. 11, 1947	Jan. 12, 1946		Jan. 11, 1947	Jan. 12, 1946		Jan. 11, 1947	Jan. 12, 1946	
NEW ENGLAND												
Maine	6	4	1	------	11	------	292	3	16	1	1	2
New Hampshire	0	0	0	------	1	------	22	12	8	0	0	0
Vermont	1	0	0	------	83	------	117	4	8	1	0	0
Massachusetts	19	4	3	------	------	------	443	262	262	1	6	8
Rhode Island	2	0	2	1	9	9	25	1	9	0	0	0
Connecticut	0	14	1	1	83	4	124	17	61	3	4	4
MIDDLE ATLANTIC												
New York	36	16	16	[1] 17	[1] 44	[1] 22	246	855	852	9	28	25
New Jersey	5	8	3	6	69	26	76	58	112	4	11	11
Pennsylvania	18	26	16	3	15	5	1,221	399	776	4	16	16
EAST NORTH CENTRAL												
Ohio	17	31	12	8	84	34	286	41	61	1	15	14
Indiana	10	11	12	19	113	26	11	46	46	3	2	2
Illinois	4	6	6	2	29	21	17	485	176	6	27	9
Michigan [2]	18	6	6	4	17	5	23	383	135	0	10	9
Wisconsin	0	0	1	20	524	147	147	69	437	3	7	4
WEST NORTH CENTRAL												
Minnesota	12	6	5	------	8	2	12	6	14	0	3	2
Iowa	1	1	6	------	------	------	31	3	44	2	1	1
Missouri	6	6	5	9	39	10	5	210	46	6	6	6
North Dakota	1	1	1	37	68	46	2	------	8	0	0	1
South Dakota	5	4	2	------	164	------	2	19	19	1	2	1
Nebraska	1	6	6	25	39	31	4	20	20	0	0	1
Kansas	1	4	4	85	253	16	4	146	68	2	1	4
SOUTH ATLANTIC												
Delaware	0	0	0	------	------	------	1	1	2	0	0	0
Maryland [2]	14	25	6	5	80	22	83	22	22	2	4	10
District of Columbia	0	0	0	8	2	2	19	8	11	0	0	1
Virginia	14	14	11	504	3,975	489	145	159	141	8	10	10
West Virginia	2	6	6	98	577	14	------	15	17	1	8	1
North Carolina	10	24	16	------	------	8	155	36	86	1	10	3
South Carolina	9	6	6	774	2,218	854	70	107	107	3	0	3
Georgia	3	9	9	14	263	157	60	9	21	0	2	2
Florida	5	18	5	18	4	4	9	32	32	6	0	1
EAST SOUTH CENTRAL												
Kentucky	11	4	5	2	178	47	2	181	152	6	6	6
Tennessee	18	14	5	31	583	92	4	68	88	2	6	6
Alabama	4	5	8	51	1,768	261	21	15	19	1	7	7
Mississippi [2]	6	18	9	------	------	------	------	------	------	8	13	5
WEST SOUTH CENTRAL												
Arkansas	8	11	11	144	1,249	212	29	18	51	0	3	3
Louisiana	8	9	9	26	5,221	9	1	22	22	4	3	3
Oklahoma	2	12	10	97	917	189	8	19	19	1	2	2
Texas	33	51	51	2,397	9,163	2,078	59	175	175	1	14	14
MOUNTAIN												
Montana	2	0	1	21	143	19	188	8	26	0	1	1
Idaho	0	1	1	23	823	2	6	227	12	0	3	0
Wyoming	1	0	0	12	------	36	1	20	20	0	0	1
Colorado	6	13	9	50	209	68	14	83	83	1	1	2
New Mexico	3	1	1	4	3	4	41	6	2	1	1	1
Arizona	2	3	1	181	565	166	77	5	7	1	1	2
Utah [2]	0	0	0	12	2,284	12	2	61	24	0	1	1
Nevada	0	0	0	------	1	------	------	15	5	1	0	0
PACIFIC												
Washington	5	2	4	------	------	1	82	245	102	1	2	9
Oregon	4	7	2	16	219	28	42	41	65	0	1	2
California	23	23	29	7	652	160	86	682	470	9	23	23
Total	340	485	353	4,728	32,685	4,330	4,215	5,314	8,225	100	262	262
2 weeks	706	895	739	8,393	80,676	8,719	7,210	8,053	16,158	188	453	489
Seasonal low week [3]	(27th) July 5–11			(30th) Jul. 26–Aug. 1			(35th) Aug. 30–Sept. 5			(37th) Sept. 13–19		
Total since low	8,272	12,587	9,774	41,368	442,924	43,556	30,097	34,207	54,420	1,154	1,957	1,957

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Dates between which the approximate low week ends. The specific date will vary from year to year.

Telegraphic morbidity reports from State health officers for the week ended Jan. 11, 1947, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever [4]		
	Week ended—		Median 1942-46	Week ended		Median 1942-46	Week ended—		Median 1942-46	Week ended—		Median 1942-46
	Jan. 11, 1947	Jan. 12, 1946		Jan. 11, 1947	Jan. 12, 1946		Jan. 11, 1947	Jan. 12, 1946		Jan. 11, 1947	Jan. 12, 1946	
NEW ENGLAND												
Maine	1	0	0	27	32	28	0	0	0	1	0	0
New Hampshire	0	0	0	3	13	9	0	0	0	0	0	0
Vermont	0	0	0	4	14	3	0	0	0	1	0	0
Massachusetts	1	0	1	148	183	209	0	0	0	4	0	0
Rhode Island	0	0	0	5	14	14	0	0	0	0	0	0
Connecticut	1	0	0	32	33	57	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York	4	7	6	286	352	399	0	0	0	8	0	1
New Jersey	0	0	0	102	68	104	0	0	0	0	1	1
Pennsylvania	0	5	0	159	191	272	0	0	0	2	3	2
EAST NORTH CENTRAL												
Ohio	0	3	1	309	198	265	1	0	0	0	1	1
Indiana	7	0	0	82	73	89	0	0	1	1	1	1
Illinois	2	2	1	127	124	231	0	0	0	8	4	1
Michigan [2]	2	3	1	119	118	118	0	0	0	0	0	0
Wisconsin	0	0	0	88	91	141	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	1	0	1	35	63	77	0	0	0	0	0	1
Iowa	2	3	1	33	30	68	0	0	0	1	0	0
Missouri	2	0	0	34	56	92	0	0	0	1	2	1
North Dakota	0	0	0	4	12	15	0	0	0	0	0	0
South Dakota	1	0	0	4	10	32	0	0	0	0	0	0
Nebraska	1	0	0	38	28	33	0	0	0	0	0	0
Kansas	5	0	0	42	64	75	0	2	1	1	0	0
SOUTH ATLANTIC												
Delaware	0	0	0	5	6	6	0	0	0	0	0	0
Maryland [2]	0	0	0	37	62	66	0	0	0	0	1	1
District of Columbia	0	0	0	16	14	25	0	0	0	0	0	0
Virginia	0	0	0	52	66	53	0	0	0	1	3	1
West Virginia	1	0	0	24	57	57	0	0	0	0	0	0
North Carolina	4	2	0	19	52	52	0	0	0	1	1	1
South Carolina	0	0	0	19	16	16	0	0	0	0	1	1
Georgia	1	0	0	9	13	20	1	0	0	1	2	2
Florida	3	3	0	18	8	8	0	0	0	0	1	1
EAST SOUTH CENTRAL												
Kentucky	0	0	0	41	43	51	0	0	0	0	1	1
Tennessee	4	1	1	30	42	58	1	0	0	5	2	2
Alabama	1	0	1	14	15	15	0	2	1	1	0	0
Mississippi [2]	3	0	0	10	17	18	0	0	0	4	1	1
WEST SOUTH CENTRAL												
Arkansas	2	2	1	8	8	10	2	0	0	0	0	2
Louisiana	2	0	0	5	10	10	0	0	0	3	4	4
Oklahoma	0	1	0	6	40	30	0	1	1	0	1	1
Texas	7	1	1	41	104	62	0	0	0	5	5	4
MOUNTAIN												
Montana	0	1	0	3	21	21	0	0	0	0	0	0
Idaho	7	0	0	16	13	14	0	0	0	0	0	0
Wyoming	1	1	0	3	9	10	0	0	0	0	0	0
Colorado	2	0	1	45	31	38	0	0	0	0	0	0
New Mexico	0	0	0	14	13	8	0	0	0	0	0	0
Arizona	0	1	1	5	11	11	0	0	0	0	1	0
Utah [2]	0	4	0	17	39	57	0	0	0	0	0	0
Nevada	0	0	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	2	1	1	42	27	31	0	0	0	2	0	0
Oregon	2	0	1	23	23	23	0	0	0	0	0	1
California	19	13	4	138	195	195	0	0	0	2	5	3
Total	91	54	82	2,386	2,722	3,687	5	5	11	43	41	49
2 weeks	187	111	80	4,416	5,105	7,094	8	9	21	81	81	94
Seasonal low week [3]	(11th) Mar. 15-21			(32nd) Aug. 9-15			(35th) Aug. 30-Sept. 5			11th) Mar. 15-21		
Total since low	24,955	13,448	12,165	31,102	43,676	45,489	62	85	141	3,609	4,332	5,078

[2] Period ended earlier than Saturday.
[3] Dates between which the approximate low week ends. The specific date will vary from year to year.
[4] Including paratyphoid fever reported separately, as follows: Massachusetts 4 (salmonella infection); New York 2; Louisiana 1; Washington 1; California 2.

Telegraphic morbidity reports from State health officers for the week ended Jan. 11, 1947, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Whooping cough: Week ended—Jan. 11, 1947	Whooping cough: Week ended—Jan. 12, 1946	Whooping cough: Median 1942-46	Week ended Jan. 11, 1947: Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis, infectious	Rocky Mt. spotted fever	Tularemia	Typhus fever, endemic	Undulant fever
NEW ENGLAND											
Maine	17	43	34								1
New Hampshire		10	8								1
Vermont	19	34	34								4
Massachusetts	196	119	189	1							
Rhode Island	9	71	19								
Connecticut	46	88	92								1
MIDDLE ATLANTIC											
New York	298	346	346	2	2						8
New Jersey	123	183	183	1							2
Pennsylvania	221	157	173				1				1
EAST NORTH CENTRAL											
Ohio	88	64	93						2		2
Indiana	34	19	23						6		5
Illinois	104	59	77	4	2		3		2		7
Michigan [2]	171	98	122		6				1		3
Wisconsin	149	56	80								
WEST NORTH CENTRAL											
Minnesota	6	12	38								
Iowa	9	5	11				1				7
Missouri	21	7	13						2		
North Dakota			4								
South Dakota		2	2								1
Nebraska	11		3								
Kansas	8	34	48				1		2		2
SOUTH ATLANTIC											
Delaware	9		1								
Maryland [2]	80	27	77			1			3		
District of Columbia	11	9	9						1		
Virginia	31	36	39			48			5		
West Virginia	36	21	25								
North Carolina	67	79	79						5	2	
South Carolina	66	93	64	2	8				1	1	
Georgia	4	20	18		1				4	14	
Florida	82	8	21	1			1			6	2
EAST SOUTH CENTRAL											
Kentucky	43	38	38								
Tennessee	23	9	29	2					3	2	1
Alabama	28	58	22						1	5	2
Mississippi [2]											2
WEST SOUTH CENTRAL											
Arkansas	9	3	11						4	1	1
Louisiana	5		2		1					14	1
Oklahoma	5	4	6								
Texas	240	125	145	4	408	57			1	16	7
MOUNTAIN											
Montana	2	1	9								
Idaho	3	21	2								
Wyoming			6								
Colorado	9	27	27								5
New Mexico		4	4		3						
Arizona	18	4	18			18					
Utah [2]	12	3	8								
Nevada		2									
PACIFIC											
Washington	23	28	33	1							
Oregon	8	10	10								
California	57	123	182		1		1			1	1
Total	2,351	2,155	2,263	18	427	124	8	0	48	62	67
Same week, 1946	2,155			31	405	162	8	0	82	78	69
Median, 1942-46	2,263			31	337	75	8	0	32	70	[5] 69
2 weeks: 1947	4,097			55	749	597	12	1	94	99	153
1946	3,528			68	855	263	14	0	52	142	108
Median, 1942-46	4,108			47	633	122	14	0	54	142	[5] 116

[2] Period ended earlier than Saturday. [5] 2-year average.

Anthrax: Maine 1 case. *Botulism:* Maryland 4 cases. *Leprosy:* California 2 cases.

WEEKLY REPORTS FROM CITIES[1]

City reports for week ended Jan. 4, 1947

This table lists the reports from 84 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0	------	0	27	1	2	0	4	0	1	1
New Hampshire:												
Concord	0	0	------	0	------	0	0	0	0	0	0	------
Vermont:												
Barre	0	0	------	0	1	0	1	0	0	0	0	2
Massachusetts:												
Boston	7	0	------	0	9	0	16	1	20	0	0	29
Fall River	0	0	------	0	------	0	1	0	4	0	0	10
Springfield	2	0	------	0	6	0	2	0	3	0	0	2
Worcester	0	0	------	0	4	0	6	1	2	0	0	9
Rhode Island:												
Providence	0	0	1	0	10	0	4	0	6	0	0	7
Connecticut:												
Bridgeport	0	0	------	0	------	0	0	0	0	0	0	4
Hartford	0	0	------	0	2	0	1	0	5	0	0	1
New Haven	0	0	------	0	38	0	2	0	4	0	0	5
MIDDLE ATLANTIC												
New York:												
Buffalo	4	0	------	0	------	0	4	0	6	0	1	3
New York	18	1	8	1	41	1	78	3	71	0	0	52
Rochester	0	0	------	0	------	0	4	0	6	0	1	------
Syracuse	0	0	------	0	------	0	0	0	5	0	0	11
New Jersey:												
Camden	1	0	------	0	------	0	1	0	1	0	0	3
Newark	0	0	------	0	2	0	4	0	11	0	0	12
Trenton	0	1	------	0	29	0	3	0	1	0	0	------
Pennsylvania:												
Philadelphia	4	0	4	1	4	0	18	1	18	0	0	35
Pittsburgh	1	0	1	0	262	1	18	0	6	0	0	6
Reading	0	0	------	0	1	0	1	0	1	0	0	6
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	1	0	------	1	1	1	3	0	2	0	0	4
Cleveland	2	0	2	0	195	2	12	0	25	0	0	9
Columbus	4	0	------	0	3	0	4	0	11	0	0	7
Indiana:												
Fort Wayne	0	0	------	0	6	0	1	0	0	0	0	------
Indianapolis	1	0	------	0	1	0	7	0	6	0	0	8
South Bend	0	0	------	0	------	0	0	0	2	0	0	------
Terre Haute	0	0	------	0	1	0	1	0	1	0		------
Illinois:												
Chicago	1	0	------	0	9	1	28	2	44	0	0	42
Michigan:												
Detroit	6	1	2	0	1	0	15	0	38	0	0	61
Flint	0	0	------	0	------	0	8	0	0	0	0	------
Grand Rapids	0	0	------	0	1	0	2	0	5	0	0	8
Wisconsin:												
Kenosha	0	0	------	0	------	0	0	0	0	0	0	------
Milwaukee	0	0	------	0	4	0	0	0	10	0	0	57
Racine	0	0	------	0	------	0	0	1	5	0	0	5
Superior	0	0	------	0	1	0	0	0	0	0	0	------
WEST NORTH CENTRAL												
Minnesota:												
Duluth	1	0	------	0	------	0	2	0	2	0	0	------
Minneapolis	2	0	------	0	8	0	5	0	6	0	0	1
St. Paul	0	0	------	0	2	0	5	0	4	0	0	------
Missouri:												
Kansas City	2	0	------	1	------	1	5	1	5	0	0	4
St. Joseph	0	0	------	0	------	0	0	0	1	0	0	11
St. Louis	2	0	1	0	6	1	16	0	14	0	0	6

[1] In some instances the figures include nonresident cases.

City reports for week ended Jan. 4, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
WEST NORTH CENTRAL—continued												
Nebraska:												
Omaha	0	0	------	0	1	1	8	0	4	0	0	2
Kansas:												
Topeka	0	0	------	0	------	0	0	0	2	0	0	------
Wichita	0	0	------	0	------	0	2	0	3	0	0	------
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0	------	0	------	0	1	0	2	0	0	1
Maryland:												
Baltimore	12	0	2	1	1	0	9	0	14	0	0	33
Cumberland	0	0	------	0	8	0	1	0	1	0	0	------
District of Columbia:												
Washington	0	0	1	0	31	2	10	0	7	0	0	11
Virginia:												
Lynchburg	0	0	------	0	------	0	0	0	1	0	0	------
Richmond	0	0	1	1	32	0	1	1	4	0	0	------
Roanoke	0	0	------	0	------	0	1	0	1	0	0	------
West Virginia:												
Charleston	0	0	------	0	3	0	0	0	0	0	0	------
Wheeling	0	0	------	0	------	0	0	0	1	0	0	------
North Carolina:												
Wilmington	0	0	------	0	5	0	0	0	0	0	0	------
Winston Salem	0	0	------	0	29	0	1	0	1	0	0	2
South Carolina:												
Charleston	0	0	5	0	1	0	1	0	0	0	0	------
Georgia:												
Brunswick	0	0	------	0	1	0	0	0	0	0	0	------
Savannah	1	0	1	1	34	0	1	0	1	0	0	------
Florida:												
Tampa	1	0	------	0	1	0	4	0	6	0	0	6
EAST SOUTH CENTRAL												
Tennessee:												
Nashville	0	0	------	1	------	0	0	0	2	0	0	------
Alabama:												
Birmingham	0	0	1	1	7	0	8	0	2	0	0	2
Mobile	1	0	3	0	------	1	1	0	1	0	0	------
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	------	1	------	0	1	0	0	0	0	------
Louisiana:												
New Orleans	1	0	2	1	9	1	8	1	2	0	1	------
Shreveport	1	0	------	0	------	0	10	1	0	0	0	------
Texas:												
Dallas	0	0	1	1	4	0	2	0	1	0	0	------
Galveston	0	0	------	0	------	0	4	0	1	0	0	------
Houston	0	0	------	0	------	1	6	0	2	0	0	1
San Antonio	0	0	1	2	------	0	4	0	1	0	0	1
MOUNTAIN												
Montana:												
Billings	0	0	------	0	2	0	5	0	1	0	0	1
Great Falls	0	0	------	0	20	0	0	0	0	0	0	------
Helena	0	0	------	0	7	0	0	0	0	0	0	------
Missoula	0	0	------	0	------	0	2	0	0	0	0	------
Idaho:												
Boise	0	0	------	0	------	0	1	0	0	0	0	------
Colorado:												
Denver	2	0	6	1	------	0	8	0	15	0	0	3
Pueblo	0	0	------	0	------	0	1	0	2	0	0	------
Utah:												
Salt Lake City	0	0	------	0	7	0	3	0	8	0	0	------

City reports for week ended Jan. 4, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
PACIFIC												
Washington:												
Seattle	7	0	------	0	2	0	5	0	3	0	1	3
Spokane	0	0	------	0	3	0	0	2	3	0	0	------
Tacoma	0	0	------	0	------	0	0	0	0	0	0	------
California:												
Los Angeles	5	0	7	0	5	1	6	4	14	0	0	7
Sacramento	0	0	------	0	------	0	3	2	0	0	0	3
San Francisco	1	0	1	0	3	1	8	1	10	0	0	------
Total	91	3	51	15	876	17	391	22	466	0	5	497
Corresponding week, 1946	69	------	1,079	118	1,505	------	696	------	541	0	9	503
Average 1942-46	72	------	1,345	[2] 146	[3] 1,509	------	[2] 691	------	1,001	0	10	688

[2] 3-year average, 1944-46.
[3] 5-year median, 1942-46.

Dysentery, amebic.—Cases: New York 9.
Dysentery, bacillary.—Cases: Detroit 1; Los Angeles 1.
Dysentery, unspecified.—Cases: San Antonio 3.
Tularemia.—Cases: St. Louis 1; Wichita 1.
Typhus fever, endemic.—Cases: Tampa 1; Mobile 3; New Orleans 1; Houston 1.

Rates (annual basis) per 100,000 population, by geographic groups, for the 84 cities in the preceding table (estimated population, 1943, 33,622,700)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza Case rates	Influenza Death rates	Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
New England	23.5	0.0	2.6	0.0	240	2.6	91.5	5.2	125	0.0	2.6	183
Middle Atlantic	13.0	0.9	6.0	0.9	157	0.9	58.3	1.9	58	0.0	0.9	59
East North Central	9.2	0.6	2.5	0.6	137	2.5	46.6	1.8	88	0.0	0.0	123
West North Central	14.1	0.0	2.0	2.0	24	6.0	86.5	2.0	82	0.0	0.0	48
South Atlantic	25.8	0.0	18.4	5.5	260	3.7	55.2	1.8	72	0.0	0.0	98
East South Central	9.1	0.0	36.4	18.2	64	9.1	36.4	0.0	46	0.0	0.0	18
West South Central	5.7	0.0	11.5	14.3	37	5.7	100.4	5.7	20	0.0	2.9	6
Mountain	15.9	0.0	47.7	7.9	286	0.0	158.9	0.0	207	0.0	0.0	32
Pacific	20.6	0.0	12.7	0.0	21	3.2	34.8	14.2	47	0.0	1.6	21
Total	14.2	0.5	7.9	2.3	136	2.6	60.8	3.4	72	0.0	0.8	77

TERRITORIES AND POSSESSIONS

Hawaii Territory

Plague (rodent).—Under date of January 2, 1947, plague infection was reported in 1 rat found dead in Kalopa Mauka Camp, Hamakua District, Island of Hawaii, T. H.

Panama Canal Zone

Notifiable diseases—October 1946.—During the month of October 1946, certain notifiable diseases were reported in the Panama Canal Zone and terminal cities as follows:

Disease	Residence [1]									
	Panama City		Colon		Canal Zone		Outside the Zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox	7		3		4		5		19	
Diphtheria	17	1	2	1	2		13	3	34	5
Dysentery:										
Amebic	2				1		2		5	
Bacillary	3		1				1		5	
Leprosy		1								1
Malaria [2]	10		1		22		42	5	75	5
Measles	23	3	30	1	29		15		97	4
Mumps					16		2		18	
Pneumonia		15		8	21	4		3	[3] 21	30
Tuberculosis		27		8	3	3		2	[3] 3	40
Typhus fever			1						1	
Whooping cough					4				[3] 4	

[1] If place of infection is known, cases are so listed instead of by residence.
[2] 14 recurrent cases.
[3] In the Canal Zone only.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended December 21, 1946.—During the week ended December 21, 1946, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		41		214	501	26	30	79	134	1,025
Diphtheria		4		45	6	2	3		5	65
Dysentery:										
Amebic					1					1
Bacillary					1					1
German measles				5	7		1	7	3	23
Influenza		13			8				5	26
Measles		279	2	51	168	105	328	224	176	1,333
Meningitis, meningococcus				4		1				5
Mumps				56	319	82	106	19	132	664
Poliomyelitis				11	5			1		17
Scarlet fever	1	6	11	77	116	5	3	6	8	233
Tuberculosis (all forms)		7	5	107	58	8	12	33	83	313
Typhoid and paratyphoid fever				13			1		1	15
Undulant fever				1	2	1			1	5
Venereal diseases:										
Gonorrhea		23	9	76	99	38	26	52	(1)	321
Syphilis		8	4	92	86	8	20	12	(1)	230
Other forms				1					(1)	1
Whooping cough	3	3	3	60	69	7		2	3	150

Report not received for this period.

From consular reports, international health organizations, medical officers of the Public Health Service, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

[C indicates cases]

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place		January—October 1946	November 1946	December 1946—week ended— 7	14	21	28
ASIA							
Afghanistan	C		30				
Burma	C	1,289	173		45	6	
Bassein	C	29					
Moulmein	C	76	112	8	1	3	
Rangoon	C	28					
Ceylon	C	85	18				
China:							
Anhwei Province	C	2,749					
Chekiang Province	C	4,633	8				
Formosa, Island of	C	1,980					
Fukien Province	C	1,355	3				
Foochow	C	709	3				
Honan Province	C	1,654					
Hopeh Province	C	293					

CHOLERA—Continued

Place		January—October 1946	November 1946	December 1946—week ended— 7	14	21	28
ASIA—continued							
China—Continued							
Hunan Province	C	2,040					
Hupeh Province	C	359					
Ichang Province	C	147					
Kiangsi Province	C	1,594					
Kiangsu Province	C	[1] 9,218	3				
Shanghai	C	[1] 4,570	3				
Kwangsi Province	C	952					
Kwangtung Province	C	4,888	2				
Canton	C	2,002					
Hong Kong	C	505					
Kweichow Province	C	8					
Macao, Island of	C	2					
Shantung Province	C	21					
Szechwan Province	C	137					
Yunnan Province	C	17					
India	C	65,107	4,894				
Bombay	C		[2] 2				
Calcutta	C	1,843	[1] 34	20	14	14	
Cawnpore	C	45					
Chittagong	C	8					
Madras	C	3	2				
India (French)	C	2	2				
Indochina (French):							
Cambodia	C	402	30				
Cochinchina	C	858	9				
Bien Hoa	C	24					
Chaudok	C	21					
Mytho	C	144					
Rachgia	C	1					
Saigon-Cholon	C	38	11			2	1
Vinh-long	C	7		1			
Laos	C	21					
Japan	C	1,200	4	2	7		
Korea (Chosen)	C	[3] 11,851					
Malay States	C	234	11				
Manchuria	C	18,454	4				
Mongolia	C	16					
Siam (Thailand)	C	3,520	351				
Bangkok	C	494	31		9	22	
Straits Settlements: Singapore	C	[2] 1					

[1] Includes imported cases.
[2] Imported.
[3] From the beginning of the outbreak in April or May to approximately Sept. 1, 1946.

PLAGUE

[C indicates cases; P, present]

AFRICA							
Algeria	C	2					
Bechuanaland	C	[1] 21					
Belgian Congo	C	30		2			
British East Africa:							
Kenya	C	38					
Uganda	C	12					
Egypt	C	[*] 216	1				
Alexandria	C	126					
Ismailiya	C	27					
Matariya	C	12					
Port Said	C	18	1				
Suez	C	32					
Libya: Tripolitania—Plague-infected rats		1					
Madagascar	C	186	25		[3] 3		
Union of South Africa	C	2	3	1			1
ASIA							
Burma	C	1246	206		38	82	
Bassein	C	23					
Mandalay	C		1				
Rangoon	C	154					

See footnotes at end of table.

PLAGUE—Continued

Place		January–October 1946	November 1946	December 1946—week ended— 7	14	21	28
ASIA—continued							
China:							
Chekiang Province	C	710	3				
Formosa, Island of	C	11					
Fukien Province	C	4,366	1				
Amoy	C	307					
Foochow	C	1,400	1				
Kiangsi Province	C	267					
Kwangtung Province	C	415					
Yunnan Province	C	280					
India	C	15,316	2,309				
Indochina (French): Cochinchina	C	48					
Java	C	34	4				
Manchuria	C	[1] 316					
Palestine	C	16		1			
Siam (Thailand)	C	27	11				
EUROPE							
Great Britain: Malta, Island of	C	6					
Portugal: Azores	C	[4] 15	1	3			
NORTH AMERICA							
Canada.[5]							
SOUTH AMERICA							
Argentina:							
Buenos Aires	C		8				
Cordoba Province	C	1					
Bolivia:							
Chuquisaca Department	C	1					
Santa Cruz Department	C	12					
Tarija Department—Plague-infected rats		P					
Brazil:							
Alagoas State	C	2					
Bahia State	C	32					
Ceara State	C	44					
Minas Geraes State	C						[6] 12
Parahyba State	C	18					
Pernambuco State	C	35					
Ecuador:							
Chimborazo Province	C	2					
Loja Province	C	28	6				
Peru:							
Lambayeque Department	C	14					
Lima Department	C	20					
Piura Department	C	34					
Tumbes Department	C	1					
Plague-infected rats		P					
Venezuela	C	1					
OCEANIA							
Hawaii Territory: Plague-infected rats		[7] 6					1

[1] Includes 16 cases of pneumonic plague.
[2] For the period Dec. 1-15, 1946.
[3] Includes 52 cases of pneumonic plague.
[4] Includes 2 cases of pneumonic plague.
[5] The imported suspected case previously reported has not been confirmed. Under date of Sept. 14, 1946, plague infection was reported in a pool of fleas from squirrels in Alsask and in a pool of fleas from squirrels in Superb, Saskatchewan, Canada.
[6] For the month of December 1946.
[7] Plague infection was also proved in Hawaii Territory as follows: On Feb. 5, 1946, in a pool of 29 rats; on Apr. 18, 1946, in a pool of 54 fleas and 15 lice recovered from 7 rats and 22 mice; under date of July 8, 1946, in a pool of 50 fleas recovered from 7 rats and 46 mice, and in a pool of 51 fleas recovered from 10 rats; under date of July 17, 1946, in a pool of 48 fleas recovered from 22 rats, and in a pool of 56 fleas recovered from 33 rats; under date of Sept. 12, 1946, in a pool of 48 fleas recovered from 22 rodents; under date of Oct. 9, 1946, in a pool of 36 rats found on Sept. 10, 1946.

SMALLPOX

[C indicates cases; P, present]

Place		January–October 1946	November 1946	December 1946—week ended— 7	14	21	28
AFRICA							
Algeria	C	258					
Angola	C	29					
Basutoland	C	46					
Bechuanaland	C	11					
Belgian Congo	C	[1] 3,076	[1] 204	[1] 39	[1] 41		
British East Africa:							
Kenya	C	809	49				
Nyasaland	C	560	157	11			
Tanganyika	C	5,468	536	[2] 658			
Uganda	C	558	10	3			
Cameroon (French)	C	73	17		1		
Dahomey	C	1,570	11				
Egypt	C	384		3			
Eritrea	C	28					
French Equatorial Africa	C	162					
French Guinea	C	922	18				
French West Africa: Dakar District	C	40					
Gambia	C	7					
Gold Coast	C	1,040	245	30			
Ivory Coast	C	1,382	83			[3] 39	
Liberia	C	40	150				
Libya	C	476	282	54	57	50	54
Madagascar	C	1					
Mauritania	C	1					
Morocco (French)	C	1,854	21				
Morocco (Int. Zone)	C	178					
Morocco (Spanish)	C	5					
Mozambique	C	4					
Nigeria	C	6,091	66				
Niger Territory	C	472	57			[3] 19	
Rhodesia:							
Northern	C	410	14				
Southern	C	144	4				
Senegal	C	95					
Sierra Leone	C	451					
Somaliland (Italian)	C	1					
Sudan (Anglo-Egyptian)	C	53	3				
Sudan (French)	C	1,983	4			[3] 7	
Swaziland	C		1				
Togo (French)	C	242	52				
Tunisia	C	102					
Union of South Africa	C	661	13	P	P		
ASIA							
Arabia	C	2					
Burma	C	1,759	76		51	41	
Ceylon	C	502	29				
China	C	1,152	905	196	173	106	104
India	C	57,770	868				
India (French)	C	3					
India (Portuguese)	C	17	2				
Indochina (French)	C	2,030	130	4	42	10	
Iran	C	26					
Iraq	C	8	14				
Japan	C	17,661	61	23	24		
Malay States	C	1,666	558	262	181	211	
Palestine	C	[4] 2					
Rhodes, Island of	C	[4] 1					
Siam (Thailand)	C	17,250	441				
Straits Settlements	C	78	108	13	2	6	5
Syria and Lebanon	C	8			1		
Turkey (see Turkey in Europe).							
EUROPE							
Czechoslovakia	C	24					
France	C	15	1				
Germany	C	1					
Gibraltar	C	[4] 3					
Great Britain:							
England and Wales	C	[5] 53					
Malta, Island of		10					
Scotland	C	2					
Greece	C	114					
Italy	C	548					

See footnotes at end of table.

SMALLPOX—Continued

Place		January–October 1946	November 1946	December 1946—week ended— 7	14	21	28
EUROPE—continued							
Portugal	C	54	3				
Spain	C	7					
Turkey	C	17					
Yugoslavia	C	1					
NORTH AMERICA							
Canada	C	2					
Guatemala	C	55					
Honduras	C	4					
Mexico	C	396					
Nicaragua	C	3					
SOUTH AMERICA							
Argentina	C	69					
Bolivia	C	874					
Brazil	C	[1] 289	15	2	2		
Colombia	C	849	165				
Ecuador	C	54	28				
Paraguay	C	[1] 289					
Peru	C	451					
Uruguay	C	40					
Venezuela	C	[1] 896	[1] 849				
OCEANA							
Hawaii Territory	C	[6] 1					

[1] Includes alastrim.
[2] Includes delayed reports.
[3] For the period Dec. 1–20, 1946.
[4] Imported.
[5] Includes imported cases.
[6] Off-shipping.

TYPHUS FEVER *

[C indicates cases; P, present]

Place		January–October 1946	November 1946	December 1946—week ended— 7	14	21	28
AFRICA							
Algeria	C	788					
Basutoland	C	7					
Belgian Congo [1]	C	2,480	77	4			
British East Africa:							
Kenya	C	24	2				
Uganda	C			1			
Egypt	C	1,378	15	10	2		
Eritrea	C	1,057	267	23	23		
French West Africa: Dakar District	C	7					
Libya	C	85	3				
Madagascar	C	1					
Morocco (French)	C	3,704	40				
Morocco (Int. Zone)	C	53					
Morocco (Spanish)	C	25					
Nigeria	C	33	1				
Rhodesia, Northern	C	1					
Sierra Leone [1]	C	5					
Tunisia [1]	C	183					
Union of South Africa [1]	C	498	12	P	P		
ASIA							
Arabia [2]	C	2					
Burma [1]	C	2	1		1		
China [1]	C	354	5	1	1	2	
India	C	299				1	
Indochina (French)	C	61					
Iran	C	138	4				
Iraq	C	196	9	5	2	1	3
Japan	C	30,762	145	64	54		
Malay States	C	3					
Manchuria	C	89					
Palestine [2]	C	91	1				
Philippine Islands [1]	C	3	1				
Straits Settlements	C	2					
Syria and Lebanon	C	34	2				
Trans-Jordan	C	21					
Turkey. (See Turkey in Europe.)							

See footnotes at end of table.

TYPHUS FEVER—Continued

Place		January—October 1946	November 1946	December 1946—week ended— 7	14	21	28
EUROPE							
Albania	C	96					
Austria	C	34	1				
Belgium [1]	C	14					
Bulgaria	C	979	54	25			
Czechoslovakia [1]	C	785	8				
France [1]	C	16					
Germany	C	1,868				1	
Gibraltar [2]	C	1					
Great Britain:							
England and Wales	C	1					
Malta and Gozo [1]	C	27	2				
Greece [1]	C	550	34	8	19	13	
Hungary	C	942	76	18	10		14
Italy	C	25					
Netherlands [1]	C	24					
Poland	C	3,285	72	19			
Portugal	C	10	2	1	1		
Rumania	C	7,697	250	138			
Spain	C	26					
Canary Islands	C	2					
Sweden [2]	C	1					
Switzerland [1]	C	2					
Turkey	C	1,232	93	25	27	35	
Union of Soviet Socialist Republics: Ukraine	C	P					
Yugoslavia	C	2,954	17				
NORTH AMERICA							
Costa Rica [2]	C	77					
Cuba [2]	C	19					
Guatemala	C	782	28				
Jamaica [2]	C	36	2				
Mexico	C	1,469					
Panama Canal Zone	C	1					
Panama (Republic)	C	2	1				
Puerto Rico [2]	C	93	8				
Virgin Islands [2]	C	8					
SOUTH AMERICA							
Argentina	C	5	2				
Bolivia	C	249					
Brazil [1]	C	10	6			1	
Chile	C	448					
Colombia	C	467	218				
Curacao [2]	C	1					
Ecuador [1]	C	966	46				
Paraguay	C	1					
Peru	C	788					
Venezuela [1]	C	101					
OCEANIA							
Australia [2]	C	144	2				
Hawaii Territory [2]	C	75	8				

*Reports from some areas are probably murine type, while others probably include both murine and louse-borne types. [1] Includes cases of murine type. [2] Murine type.

YELLOW FEVER

[C indicates cases; D, deaths]

Place		January—October 1946	November 1946	December 1946—week ended— 7	14	21	28
AFRICA							
French Equatorial Africa: Carnot	C		[1] 3	[1] 5			
Ivory Coast: Seguela	C		1				
Nigeria:							
Ibadan	C	1					
Ilorin	C	1					
Kafanchan	C	2					
Ogbomosho	C	41					
Sierra Leone: Pujehan	C	1					
SOUTH AMERICA							
Bolivia: Santa Cruz Department	D	[2] 40					
Brazil: Para State	D	1					
Colombia:							
Caqueta Territory	D	2					
Magdalena Department	D	1					
Santander Department	D	13					
Peru: San Martin Department	D	3					
Venezuela:							
Tachira State	C	4					
Trujillo State	C	4					
Zulia State	C	4					

[1] Includes 2 suspected cases.
[2] Diagnosis confirmed in 14 cases and 10 deaths.
[3] Diagnosis confirmed in 4 cases.

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

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EDITORIAL

ECONOMY OF BED USAGE IN TUBERCULOSIS

During the last four decades, there have been several complete reversals of opinion regarding the relative needs for hospitalization of persons with minimal tuberculosis as compared to those with advanced disease. Who shall be chosen for hospitalization and who shall be given less systematic care are questions that must be answered if the present limited supply of beds is to realize maximum use. In some parts of the country, State laws actually require that only minimal cases be hospitalized, and these for too short a time. In other areas, only far-advanced infectious cases are given hospital care. Neither practice shows sound public health thinking, for neither considers the tuberculosis problem in its entirety.

This problem is approached currently from two quite different points of view, that of the private chest specialist, who is interested primarily in the individual patient, and that of the public health official, who is concerned with the health of the entire community. Although apparently irreconcilable, these points of view are easily made compatible if certain fundamental concepts are understood and accepted. For instance, both the chest specialist and the public health official must agree that a bed occupied by a person who could be supervised adequately as an ambulatory case is a bed lost to a patient whose disease could be arrested and prevented from spreading.

In any community, there are specific epidemiological data which must be analyzed and evaluated before a sound program of efficient bed utilization can be instituted and maintained. The morbidity and mortality rates are of great importance in determining the extent of the local problem. A knowledge of the quantity and availability of hospital beds, clinics, nursing, medical, social, and other professional services for the care and supervision of the tuberculous is equally important. The number and distribution of physicians trained in

This is the twelfth of a series of special issues of PUBLIC HEALTH REPORTS devoted exclusively to tuberculosis control, which will appear the first week of each month. The series began with the Mar. 1, 1946 issue. The articles in these special issues are reprinted as extracts from the PUBLIC HEALTH REPORTS. Effective with the July 5 issue, these extracts may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., for 10 cents a single copy. Subscriptions are obtainable at $1.00 per year; $1.25 foreign.

chest diseases constitute fundamental factors in the management of ambulatory cases and in economy of bed usage. In any effective program of treatment and supervision, it is necessary to have or to establish certified laboratories in which trustworthy tests for the detection of tubercle bacilli are performed.

Such critical studies provide the answers to certain questions that leaders in tuberculosis control in every community must answer before they can develop and operate an effective hospital program.

What is the fundamental purpose of hospitalization of the tuberculous—isolation or treatment?

Does the community, with a scarcity of beds, benefit more through the hospitalization of minimal inactive cases or of advanced infectious cases?

Should communities develop preventoria for children who are heavily exposed and certain to become infected, but do not yet have clinical disease?

The answer to the first question is unequivocal: The protection of the health of the community takes precedence over the health of any individual.

The answer to the second question inevitably follows: The positive sputum case must be hospitalized to prevent spread of the disease; the earlier the case is found, the better.

Study of family contacts has provided the answer to the third question: Hospitalize the infectious adult source and thereby remove the danger of infecting children in the home. It is easier and more economical to hospitalize one parent than three or more children.

There is a known shortage of over 50,000 beds for the tuberculous in the United States. This condition appreciably affects the quantity and quality of care that can be given. It is not uncommon for a large area to have only 200 beds and a register of more than 400 positive sputum advanced cases and twice that number with minimal disease.

Who will be chosen first for the available beds? How can the limited number of beds be used to greatest advantage?

It is suggested that the positive sputum cases be separated into two groups: The positive sputum case that has little hope of recovery and the positive sputum case with remediable disease. Hospitalize first the remediable positive sputum group. The irremediable positive sputum case could be isolated in the general hospital until the terminal episode. In this way both isolation and treatment are accomplished. In the event that such arrangements are impracticable, the hopeless case should be cared for in the home under the best possible isolation technique, supervised by a public health nurse.

Advanced positive sputum cases already in sanatoria but not benefiting from treatment should be discharged and replaced by positive

sputum cases that have chances for recovery. Such a practice protects the community and provides the opportunity to restore the health of the despairing ill. The minimal case with laboratory and other evidence of active disease should be given equal opportunity with the advanced remediable case, so that progression of disease can be prevented. Minimal cases that have, after careful and repeated search, no laboratory evidence of tubercle bacilli, can be supervised as ambulatory patients in the clinics and the offices of physicians trained in chest diseases. The utmost care must be exercised in the supervision of these ambulatory cases. They should be observed in the clinic and should have serial X-ray examinations at frequent intervals. The clinician must constantly watch for any indications of disease progression. Indeed, this type of patient must come for a check-up even when minor upper respiratory infections occur.

It may appear to be contradictory to find minimal cases and not to hospitalize all of them immediately. Yet experience shows that only a limited number of these cases break down. Careful X-ray laboratory study will facilitate the selection of those with early evidence of progressive disease. These can be hospitalized. It is wasteful to hospitalize all minimal cases when hospital facilities are grossly inadequate. If this is done, beds are occupied unnecessarily by people who are not sick, and the truly sick and infectious advanced cases continue to spread tuberculosis and to progress to hopeless advanced disease. It does not make sense to hospitalize minimal cases of all types when prolonged follow-up studies have demonstrated that only a limited number really needed sanatorium care. Even patients whose serial X-ray films show minor changes, in the absence of laboratory findings and symptoms, can be kept under control by continuous ambulatory medical supervision.

We must think of the community first and the individual next. Available beds should be used principally for the spreaders of tuberculosis whose lesions can be arrested, and for minimal cases with laboratory evidence of active disease. This does not preclude the hospitalization of a limited number of minimal cases when the question of activity is still in doubt. This is in accord with changing social views on illness. It is becoming more and more widely recognized that a tuberculous patient is not only an individual in a community but also a carrier of a disease in that community. We must choose carefully in terms of social welfare if limited resources are to be utilized and tuberculosis eventually eradicated.

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STANDARDIZATION OF TUBERCULIN

By Johannes Holm, *Chief, Tuberculosis Division, State Serum Institute of Copenhagen, Denmark, and Advisory Consultant, Tuberculosis Control Division, United States Public Health Service;* and Poul Lind, *Pharmacologist, Assistant in the Tuberculosis Division, State Serum Institute of Copenhagen, Denmark*

INTRODUCTION

It is a well-known fact that two batches of tuberculin may differ in strength even if prepared in exactly the same manner—by the same man in the same laboratory, using the same strain of tubercle bacilli, the same culture medium, the same time for incubation, and the same method for preparation. The strength of the tuberculin prepared in different laboratories using different strains of tubercle bacilli, culture media, etc., will often vary considerably. This applies not only to old tuberculin (OT) but to purified tuberculin (PT) as well.

For the practical use of tuberculin in tests on man, it is of great importance to know fairly exactly the strength of the tuberculin employed, that is, the strength of the tuberculin in comparison with a recognized standard. Only when the strength of the tuberculin is known can the tuberculin test be used safely. When it is stated, for instance, that a dose of 0.0001 mg. PPD–S can be used without giving too many inconveniencing reactions, this holds true only for the particular batch of PPD–S tested. Another batch of PPD–S might be so strong that a dose of 0.0001 mg. would be too large.

The results of different tuberculin surveys can be compared only if the same dose of tuberculin of the same strength has been used or, within limits, if the comparative strength of the tuberculin employed is known. One of the reasons that tuberculin tests have been considered unreliable, especially for use in mass surveys, is that there has been too little attention paid to the facts that tuberculin may differ widely in strength and that the standardization most commonly employed has often been unsatisfactory. In using tuberculins that vary in strength, even if the doses are equal, almost any percentage of reactors can be obtained among the same population groups.

Extensive investigations made in the State Serum Institute in Copenhagen have shown that it is possible, with a relatively high degree of exactness, to compare the strength of two tuberculins. Following is a brief review of these studies and a detailed description of the method now used for standardization of tuberculin in Den-

mark. For further information the reader is referred to the publications listed under "References."

METHOD FOR STANDARDIZATION OF TUBERCULIN.

The term "standardization," originally meaning "comparison of the strength of a certain batch with that of a recognized standard," is often used for the mere comparison of two batches. In the following, the word will be used in the latter sense.

Various methods have been used for the standardization of tuberculin. The oldest is the "shock" method. This method is based upon the fact, discovered by Robert Koch in 1891 (*1*), that tuberculin injected subcutaneously into a tuberculous guinea pig will kill the animal in 1 to 2 days. The method was worked out by Otto in 1905 (*2*), who tried to determine for each of the tuberculins the dose that would kill 50 percent of the animals injected. To obtain an exact comparison between two tuberculins, a great number of animals must be used; by using 100 animals, for instance, only a rough estimate can be obtained. This, of course, is one of the disadvantages of the method.

The intracutaneous tuberculin reaction in guinea pigs was worked out as a method for standardization by Römer and Joseph in 1909 (*3*). This method is based upon the experience that different doses of the same tuberculin will give reactions of different appearance and size in tuberculous guinea pigs.

Standardization by means of intracutaneous reactions in man was first tried by Löwenstein-Brill in 1919 (*4*). She tried to compare tuberculins by finding the lowest dose of each that would give a reaction when injected intracutaneously in tuberculin-sensitive persons. Because of the difficulty in distinguishing between small typical tuberculin reactions and merely traumatic and nonspecific reactions, she gave up this method.

In 1934 Johannes Holm published the first paper (*5*) on successful standardization of tuberculin by means of intracutaneous reactions in man. The method was based on the observation that different doses of the same tuberculin gave reactions of different sizes when injected intracutaneously in tuberculin reactors, which was the same principle Römer and Joseph used for guinea pigs. By using different doses, it was possible to obtain a sensitivity curve for each reactor, giving the size of reaction as ordinate and the dose employed as abscissa. By giving the same person three doses of each of the two tuberculins to be compared, a sensitivity curve for each tuberculin was obtained, and the distance between the two curves on the abscissa gave the difference in the strength of the two tuberculins. In 1938, this method was modified somewhat by K. A. Jensen and co-worker (*6*), who used only

two doses of each tuberculin and compared directly the size of the two pairs of reactions.

Another method of standardization by using the intracutaneous reaction in man has often been employed—for instance, by Seibert and Du Four (7). By this method, only one dose of each of the two tuberculins is given, one in each arm of the persons tested. The comparison is made between the percentage reacting to each of the two tuberculins. If only a small difference in the two percentages is obtained, the two doses employed are considered equal.

CHOICE OF METHOD FOR STANDARDIZATION

In selecting the method of standardization, it is necessary to consider the use to be made of the tuberculin. A tuberculin that is to be used for intracutaneous tests in man should be standardized by one of the intracutaneous methods for standardization in man. This should be done because the effect obtained by intracutaneous injection is not always parallel to that obtained by subcutaneous injection in guinea pigs. The two effects, to some degree, might be due to different components of the tuberculin. A standardization by means of the shock method in guinea pigs, therefore, does not permit one to draw exact conclusions as to the intracutaneous effect in guinea pigs. Furthermore, a standardization by means of intracutaneous injection in guinea pigs does not always give parallel results with standardization by the intracutaneous method in man.

In Denmark, the method used by Seibert and Du Four was found unreliable unless a great number of persons with different sensitivity were used. We have preferred, therefore, to base the standardization on the method in which several doses of each of the two tuberculins are given to the same person. The intracutaneous method on guinea pigs is used only as a preliminary method, to obtain a fairly good estimate.

STANDARDIZATION BY MEANS OF THE INTRACUTANEOUS METHOD ON TUBERCULOUS GUINEA PIGS

Only white guinea pigs weighing 400–500 gm. are used. The animals are inoculated intraperitoneally with an amount of moderately virulent tubercle bacilli sufficient to render them strongly tuberculin-positive in about 4 weeks. This is usually a dose of 0.001 mg. of our standard strain E5.

It is of great importance in standardization that the injections of tuberculin be given as carefully as possible.

The injections are given with a long tuberculin syringe having a capacity of 1 cc., graduated to 0.01 cc., and with a shortened needle, No. 20, having an absolutely sharp, somewhat beveled point, made of stainless steel, and fitting precisely the nozzle of the syringe.

For the intracutaneous injection, a little fold of the skin is lifted between two fingers, and the point of the needle is introduced into the upper layer of the skin to such depth that the "eye" of the needle is just concealed. Care must be taken that exactly 0.1 cc. is injected, and that none of the liquid flows back along the piston; this may happen if too great a pressure is exerted at the point of injection. If a drop or two of the tuberculin solution flows out at the site of the injection, it is because the injection is not placed deeply enough in the skin. When the injection is given correctly, the result will be a well-defined papule with a diameter of about 10 mm.

Upon injection of several dilutions of the same tuberculin, the weakest solution is injected first, then the second weakest, and so on. Before each injection, the syringe and needle are flushed with the solution to be employed. If dilutions of several tuberculins are to be injected, a separate syringe must be used for each tuberculin. When the injections are finished, the syringe and needle must be flushed thoroughly several times with distilled water, as tuberculin has a tendency to adhere to the side of the syringe (*8*, *9*).

READING OF THE TUBERCULIN REACTIONS ON GUINEA PIGS

The tuberculin reactions are read after 24 and 48 hours. Distinction is made among 3 different degrees of reaction, recorded by means of the symbols +++, ++, and +, as first described by Römer and Joseph (*3*).

+++ --------- central extravasation of blood, surrounded by a porcelain-white zone, which is enclosed by a hyperemic border ("cockarde reaction").

++ ----------- the same as the preceding without central extravasation of the blood.

+ ------------- nodular swelling and redness.

The diameters of each zone of the reaction are measured exactly in millimeters. In order that the reactions may stand out distinctly on the background of surrounding normal skin, and the individual zones be sharply defined, the skin of the animal must not be cold. It is preferable, therefore, to perform the measuring in daylight at a room temperature of about 20° C.

Additional comparison of the reactions is obtained by palpation. As the increase in the thickness of the skin does not feel alike to the right and left hand, the palpation is always performed with the fingers of the same hand.

PRELIMINARY TEST FOR SENSITIVENESS TO TUBERCULIN IN GUINEA PIGS

About 4 weeks after the animals have been infected, a preliminary test for sensitivity is made with an intracutaneous injection of 1/400 mg. purified tuberculin (PT). The abdomen is shaved gently so as not to injure or irritate the skin, and the injection is given in the middle of the abdomen. Here the skin is thin and flabby, giving a poorly defined tuberculin reaction, greatly elongated. On the back and upper part of the sides, the skin is thicker and firmer, giving considerably better tuberculin reactions. As both sides of the back are to be used for the standardization, the abdomen is always used for the preliminary test.

This test affords a rough classification of the infected guinea pigs in two groups: One, made up of animals with +++ reactions; the other, of animals with ++ and + reactions. For the standardization proper, the +++ reactors are injected with doses of 1/100, 1/200, 1/400, and 1/800 mg. of PT per 0.1 cc. The ++ and + reactors are injected with doses of 1/50, 1/100, 1/200, and 1/400 mg. per 0 1 cc.

PROCEDURE OF THE STANDARDIZATION WITH GUINEA PIGS

The standardization is performed 1 week after the preliminary test. The tuberculin doses are injected within the area extending from the spinal column to a little below the middle of the flank, and from the axillary fold to the pelvic bones. Throughout this area the tuberculin sensitivity is about the same. Care should be taken that the reactions or pairs of reactions to be compared are produced, as nearly as possible, on corresponding spots.

The smallest dose of each tuberculin is placed posteriorly, and the largest dose anteriorly. For more efficient utilization of the space, the four injections are placed in a zig-zag pattern. On one side of the animal, the four doses of the standard tuberculin are given, and the four corresponding doses of the other tuberculin are injected symmetrically on the other side.

An example of such a standardization of an unknown purified tuberculin on a tuberculous guinea pig is given in table 1. This example shows that the unknown purified tuberculin employed is equal to or somewhat weaker than the standard.

If, on standardization, the unknown tuberculin is found to be, for example, only about half as potent as the standard, the comparison is repeated with increased doses of the unknown tuberculin. This time, on the corresponding spot on the guinea pig, 1/100 mg. standard tuberculin is compared with 1/50 mg. of the unknown tuberculin; 1/200 mg. standard tuberculin is compared with 1/100 mg. unknown; and so on. For each standardization on tuberculous guinea pigs, four animals as a rule are used.

TABLE 1.—*Reactions on a tuberculous guinea pig injected with standard tuberculin in certain dilutions and with tuberculin of unknown strength in the same dilutions*

[Figures express diameter of reaction in millimeters]

Dose (in milligrams)	24 hours						48 hours						Standard compared to unknown by palpation
	Standard			Unknown			Standard			Unknown			
	Erythema	Induration	Necrosis	Erythema	Induration	Necrosis	Erythema	Induration	Necrosis	Erythema	Induration	Necrosis	
1/100	20	15	(?)	20	15	9	20	15	------	18	14	-----	> Greater.
1/200	20	14	8	18	13	9	17	11	------	16	11	------	> Greater
1/400	15	(?)	------	17	(?)	------	13	------	-----	12	------	------	≥ Greater or equal.
1/800	15	------	------	14	------	------	11	------	------	11	------	------	= Equal.

STANDARDIZATION BY MEANS OF THE INTRACUTANEOUS METHOD ON HUMAN TUBERCULIN REACTORS

The standardization on guinea pigs will give a rough estimate of the strength of the unknown tuberculin. The final and more accurate comparison of the two tuberculins must be carried out on human tuberculin reactors.

Results obtained in animal experiments are not always directly applicable to man. This holds true also for the assay of tuberculins. As a rule, however, the two classes of results agree fairly well, so that the standardization on humans merely gives a more exact expression for the rougher estimate on guinea pigs. Occasionally, it happens that a tuberculin on guinea pigs is found to be more potent than the standard, although on humans it proves to be weaker than the standard. As the practical use of the tuberculins is in the Mantoux test (intracutaneous) on man, it is reasonable that their assay on humans be the decisive determination of their potency.

Persons giving a distinct reaction of 15 mm. or more on the first Mantoux test, with 1/50,000 mg. of the State Serum Institute's standard preparation PT VII, are suitable reactors for standardization of tuberculin. Persons who react strongly may also be used if, in order to avoid too inconveniencing reactions, the doses are adjusted so that the total dose injected is less than 1/50,000 mg.

The best standardizations are obtained on persons showing a steep tuberculin sensitivity curve—that is, those giving a reaction of about 20 mm. to the largest dose, and only a weak reaction of about 5 mm., or no reaction at all, to the smallest dose, which is 8 times as small as the largest. Such persons can be found in extensive serial examinations, at which several persons have to be tested with 1/50,000 mg. Another injection, with a dose of 1/200,000 mg., is placed at the same time on the same arm. If the two reactions differ greatly, the

person concerned presents a steep tuberculin sensitivity curve, and will be suitable for tuberculin standardization. For the standardizations, men are used exclusively.

TECHNIQUE OF THE INTRACUTANEOUS INJECTION ON MAN

One syringe is used for each tuberculin, and the syringes are filled and washed as described in the section, "Technique of the Intracutaneous Injection with Guinea Pigs." Instead of steel needles, however, we use shortened, absolutely sharp, platinum-iridium needles, No. 20, which can stand flaming prior to each injection. The tuberculin injection, 0.1 cc., should be placed so superficially in the skin that the papule (about 10 mm. in diameter) shows a distinct "shagreen" or "peau d'orange."

Four different doses of each of the two tuberculins are injected intracutaneously on the middle third of the volar surface of the forearms for pairwise comparison of corresponding reactions. Two pairs of doses are placed on each arm. The reactions are read after 48 and 72 hours.

The dorsal aspect of the forearm gives but poorly defined reactions, which appear less distinctly against the surrounding normal skin than do the reactions on the volar surface. The volar surface, therefore, is selected as the more suitable for standardization of tuberculin. The skin area on the middle third of the forearm gives reactions of fairly uniform size to the same dose of tuberculin. Nearer the wrist the reactions are considerably smaller, and the same applies to reactions too near the elbow joint. Reactions on the lateral aspect of the forearm often make their appearance earlier and reach their maximal size before the reactions on the medial aspect. Therefore, the four doses of each tuberculin are placed so that two will be on the lateral aspect of one arm, and the other two will be on the medial aspect of the other arm.

On the volar surface of the left forearm, the smallest dose of the standard (1/400,000) is injected distally and medially; then the smallest dose of the unknown tuberculin (1/400,000) is injected distally and laterally. The next dose of the standard (1/200,000) is injected proximally and medially, and the corresponding dose of the unknown tuberculin (1/200,000) is placed proximally and laterally. On the volar surface of the right forearm, the second largest dose of the standard (1/100,000) is injected distally and laterally; the same dose of unknown tuberculin (1/100,000) distally and medially; and finally, the largest dose of the standard (1/50,000) is injected proximally and laterally; and the same dose of the unknown tuberculin (1/50,000) proximally and medially. It is advisable to place the injections in this sequence, because if three or more subjects are to be

injected with the same two tuberculins, an injection might otherwise be misplaced.

READING OF THE TUBERCULIN REACTIONS IN MAN

In man the tuberculin reactions and the individual zones within the reactions are not always sharply defined. As in guinea pigs, however, the reactions may be divided into three categories:

+++ .... central bulla or greyish-yellow zone, surrounded by a zone of infiltration, dark red to bluish-red, which again is enclosed by a lighter and more diffuse redness.

++ .... the same as the preceding without any bulla or central greyish zone.

+ .... redness with diffuse infiltration, or redness alone.

A more detailed description of the various forms of reaction has been given by Johannes Holm (*5*).

As on guinea pigs, the diameters of the various reaction zones on man are measured in millimeters. As the reactions are not always circular, it is often necessary to give the average of at least two diameters at a right angle; furthermore, as the borders of the reaction zones often are indistinct, these measurements may readily signify a somewhat subjective estimate. The measurements must be performed in daylight and at a room temperature of about 20° C. In addition to these measurements, corresponding reactions also are compared by palpation, as mentioned in the preceding section for guinea pigs.

PROCEDURE OF THE STANDARDIZATION ON MAN

An example of such a standardization on human subjects is given in table 2. In this example, the unknown tuberculin is seen to be as potent as the standard.

TABLE 2.—*Reactions on a tuberculin positive human subject injected with standard tuberculin in certain dilutions and with tuberculin of unknown strength in the same dilution* [1]

[Figures express diameter of reaction in millimeters]

Dose of tuberculin (in milligrams)	48 hours						72 hours						Standard compared to unknown by palpation
	Standard			Unknown			Standard			Unknown			
	Erythema	Induration	Yellow zone	Erythema	Induration	Yellow zone	Erythema	Induration	Yellow zone	Erythema	Induration	Yellow zone	
1/50,000	35	15	12	35	15	11	(?)	16	11	(?)	16	11	= Equal.
1/100,000	20	12	10	30	12	9	------	15	8	------	15	8	= Equal.
1/200,000	25	10	8	25	10	7	------	11	6	------	12	7	≥ Greater or equal.
1/400,000	15	9	7	20	9	6	------	9	5	------	10	6	≥ Greater or equal.

[1] Strength of unknown tuberculin equal to that of standard tuberculin.

If the reactions to the two tuberculins differ markedly in intensity, the standardization must be repeated with adjustment of the doses, so that the pairs of reactions that are to be compared will be of the same size.

The standardization of tuberculin by this method, therefore, is merely a pairwise comparison of the four pairs of reactions. As the size of a tuberculin reaction cannot be expressed by an exact numerical value, it is not safe to rely completely on a standardizing result calculated from curves plotted on the bases of the four different tuberculin doses and the corresponding measurements of reaction. The results of the palpation must also be taken into consideration.

ACCURACY OF THE STANDARDIZATION ON MAN

The accuracy with which these standardizations can be carried out on human reactors will depend largely on the training and experience of the examiner giving the injections, and reading and estimating the reactions. Indeed, in reading the results, a subjective estimate of the infiltration and entire appearance of the reactions, as well as the measurement of the diameter of the reactions, forms the basis for the evaluation of the outcome.

In practice, the method will produce excellent, reliable results when the standardization is carried out as outlined here: First, the relative potency of the unknown tuberculin is roughly estimated. For this preliminary comparison, the standardization is made on two or four persons. Then a comparison is made of the two tuberculins, with the doses adjusted so that the reactions to be compared will be of the same size. For this final standardization, a considerable number of persons are used, depending on the exactness desired.

The following experiment will give some impression of the degree of accuracy that can be obtained in standardizing tuberculins by means of intracutaneous reactions in man.

By our usual method of standardization, the following doses of the standard tuberculin (PT VII)—1/50,000 mg., 1/100,000 mg., 1/200,000 mg., and 1/400,000 mg.—were compared with different dilutions of the same tuberculin. The doses of tuberculin from these dilutions differed in varying degree from the standard. The doses of one series were 11 percent larger than the standard (1/45,000 mg., 1/90,000 mg., 1/180,000 mg., and 1/360,000 mg.); the doses of the other series, 25 percent, 43 percent, and 66 percent, larger than the standard. The doses of each series were compared with the standard doses by intracutaneous injections on two persons. The results of these standardizations are given in tables 3 and 4.

The reactions were found to be equally strong when the difference in doses was merely 11 percent. When the difference in doses was

TABLE 3.—*Estimation of strength of dose from comparative size of diameter of reactions (in millimeters), in which PT VII in dilutions of 1/50,000, 1/100,000, 1/200,000, and 1/400,000, and PT VII in higher known dilutions, were injected into each of eight human tuberculin reactors*

Dose in milligrams		48 hours						72 hours							Estimate of strength from reactions
		Standard			Higher dose			Standard			Higher dose			Standard compared to higher dose by palpation	
Standard PT VII	Higher dose	Erythema	Induration	Yellow zone	Erythema	Induration	Yellow zone	Erythema	Induration	Yellow zone	Erythema	Induration	Yellow zone		
1/50,000	1/45,000	18	11	----	19	11	3	14	9	----	15	8	----	= equal	Individual 1: Dose 11 percent higher, equal to standard.
1/100,000	1/90,000	15	10	----	15	10	----	----	11	----	----	10	----	= equal	
1/200,000	1/180,000	13	9	----	13	9	----	13	----	----	12	5	----	> greater	
1/400,000	1/360,000	11	----	----	12	----	----	11	----	----	12	----	----	= equal	
1/50,000	1/45,000	12	----	----	13	----	----	15	----	----	15	----	----	= equal	Individual 2: Dose 11 percent higher, equal to standard.
1/100,000	1/90,000	12	----	----	12	----	----	11	----	----	12	----	----	≦ smaller or equal	
1/200,000	1/180,000	10	----	----	10	----	----	11	----	----	11	----	----	= equal	
1/400,000	1/360,000	(?)	----	----	9	----	----	10 (?)	----	----	11	----	----	< smaller	
1/50,000	1/40,000	(?)	16	11	(?)	18	12	----	15	8 (?)	----	16	8 (?)	≦ smaller or equal	Individual 3: Dose 25 percent higher, stronger than or equal to standard.
1/100,000	1/80,000	(?)	16	10	(?)	16	10	----	15	7	----	15	8 (?)	≧ greater or equal	
1/200,000	1/160,000	13	8	----	15	10	----	13	----	----	15	7 (?)	----	≦ smaller or equal	
1/400,000	1/320,000	10	5	----	11	7	----	11	----	----	12	----	----	< smaller	
1/50,000	1/40,000	25	12	----	30	13	----	18 (?)	13	----	20 (?)	12	----	≦ smaller or equal	Individual 4: Dose 25 percent higher, stronger than or equal to standard.
1/100,000	1/80,000	25 (?)	12	----	30	12	----	----	12	----	----	12	----	≧ greater or equal	
1/200,000	1/160,000	(?)	10	----	30 (?)	10	----	----	11	----	----	12	----	≧ greater or equal	
1/400,000	1/320,000	9	----	----	10	----	----	10	----	----	11	----	----	< smaller	
1/50,000	1/35,000	15	8	----	17	11	----	13	----	----	17	----	----	< smaller	Individual 5: Dose 43 percent higher, stronger than standard.
1/100,000	1/70,000	13	10	----	16	10	----	12	----	----	14	----	----	≦ smaller or equal	
1/200,000	1/140,000	13	----	----	15	8 (?)	----	12	----	----	13	----	----	> greater	
1/400,000	1/280,000	10	----	----	12	----	----	6	----	----	10	----	----	< smaller	
1/50,000	1/35,000	15	8	----	16	10	----	----	10	----	----	12	----	< smaller	Individual 6: Dose 43 percent higher, stronger than standard.
1/100,000	1/70,000	8	----	----	14	8	----	8	----	----	----	10	----	< smaller	
1/200,000	1/140,000	3	----	----	8	----	----	5	----	----	8	----	----	< smaller	
1/400,000	1/280,000	0	----	----	3	----	----	0	----	----	5	----	----	< smaller	
1/50,000	1/30,000	(?)	15	----	(?)	16	----	----	18	----	----	15	----	< smaller	Individual 7: Dose 66 percent higher, stronger than standard.
1/100,000	1/60,000	(?)	11	----	(?)	12	----	----	12	----	----	13	----	≦ smaller or equal	
1/200,000	1/120,000	11	----	----	13	----	----	10	----	----	12	----	----	≦ smaller or equal	
1/400,000	1/240,000	10	----	----	11	----	----	6	----	----	8	----	----	= equal	
1/50,000	1/30,000	(?)	13	----	(?)	12	----	(?)	10	----	(?)	13	----	< smaller	Individual 8: Dose 66 percent higher, stronger than standard.
1/100,000	1/60,000	(?)	12	----	(?)	12	----	(?)	10	----	(?)	10	----	= equal	
1/200,000	1/120,000	11	----	----	11	----	----	9	----	----	11	----	----	< smaller	
[illegible]	1/240,000	10	----	----	11	----	----	7	----	----	10	----	----	< smaller	

TABLE 4.—*Summary of estimates of strength of dose from size of reactions on eight human tuberculin reactors injected with PT VII, in standard doses and with PT VII in higher known dilutions*

Dose stronger than standard by—	Comparative impression from reaction	Dose stronger than standard by—	Comparative impression from reaction
Percent		*Percent*	
11	Equal to standard.	43	Stronger than standard.
25	Stronger than or equal to standard.	66	Stronger than standard.

25 percent, there was a slight difference in the two series of reactions. With a difference in doses of 43 percent or more, there was a definite difference in the reactions.

There are some facts that it is important to know in order to obtain a good standardization; they should therefore be mentioned briefly.

The right and left arms of all persons do not react alike to the same dose of tuberculin. This will be seen from the following experiment.

One hundred and thirty-eight tuberculin reactors were given an intracutaneous test with 1/50,000 mg. of standard tuberculin, on the middle third of the volar surface of the right forearm, and with the same dose of the same tuberculin on precisely the corresponding spot on the left forearm. One hundred and forty-one other tuberculin reactors were given two equal doses of the same tuberculin, but on the volar surface of the *same* arm (right or left); these injections were both placed in the midline of the arm. The reactions were measured and compared after 72 hours, and the results are given in table 5.

TABLE 5.—*Comparison of size of reactions from same dose of tuberculin on right and left arms and on two different locations on the right arm only, on human tuberculin reactors*

Reaction	Number of persons	Percentage distribution		Reaction	Number of persons	Percentage distribution	
Reactions on right and left arms:				Reactions on right arm:			
Right larger than left by—				Proximal larger than distal by—			
5-9 mm	8	5.8	13.0	5-9 mm	0	0	1.4
3-4 mm	10	7.2		3-4 mm	2	1.4	
1-2 mm	28	20.3	74.7	1-2 mm	11	7.8	94.3
Right equal to left	48	34.8		Proximal equal to distal	105	74.5	
Right smaller than left by—				Proximal smaller than distal by—			
1-2 mm	27	19.6		1-2 mm	17	12.0	
3-4 mm	13	9.4	12.3	3-4 mm	6	4.3	4.3
5-9 mm	4	2.9		5-9 mm	0	0	
Total	138	100.0		Total	141	100.0	

On comparison of the results obtained in the two groups, it will be noticed that among 94.3 percent of the reactors who received the doses on the same arm, the two reactions were equal in size or showed a difference not exceeding 2 mm. In the remaining 5.7 percent, the difference did not exceed 4 mm.

In contrast, in the group that received an injection on either arm, the two reactions were equal or differed no more than 2 mm. in 74.7 percent of the reactors. In the remaining 25.3 percent, the difference in the diameter of the two reactions was very great, from 3 mm. to 9 mm.

Persons who have been employed several times for standardization of tuberculin are not as suitable for such tests as persons not previously employed. The reactions of the former are not so well defined as those of the latter, and they also reach their maximum earlier. Caretakers of the animals in the State Serum Institute were employed for the first standardizations, and many of them were used several times, as a rule, at intervals of 3 to 6 months.

Later, mainly students were employed. Through this change, we first realized that persons from the outside, who had not been employed previously for such studies, were considerably more suitable for tuberculin standardization than were the caretakers of the Institute. No doubt the explanation of this difference is to be found in the circumstance that the caretakers had been employed too many times. They reacted more rapidly to the tuberculin, so that their reactions soon reached a maximum and, after 72 hours, were regressing, subsiding markedly.

INTERNATIONAL STANDARD FOR TUBERCULIN

In 1928 the League of Nations Comité Hygiène established an international standard for old tuberculin. This standard has been kept in the State Serum Institute in Copenhagen, from which samples have been sent on request to any country that wished to compare its tuberculin with that of the international standard. In this way it has been possible to give the strength of any standardized old tuberculin in comparison to the same tuberculin all over the world.

Reactions following intracutaneous injections of purified tuberculins are not the same as those following intracutaneous injections of old tuberculin. A comparison of the two by means of a standardization, therefore, is not possible. This necessitated the establishment of an international standard for purified tuberculin as well as for old tuberculin.

In 1939 the League of Nations Comité Hygiène took the first steps for establishing such a standard, but the work was interrupted by the war. In Denmark, therefore, we established our own standard of purified tuberculin, selecting our preparation PT VII as such, standardizing all later-made batches against this standard. It is to be hoped that an internationally recognized standard of PT can be established before long.

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TUBERCULIN UNITS

As the strengths of different batches of tuberculin vary considerably, it is necessary to give the dose of a tuberculin in comparison to the standard. For this reason it is not practical to give the dose of a tuberculin by weight.

In Denmark, since 1939, we have given the doses in tuberculin units (T. U.):

1 T. U.=1/50,000 mg. of the Standard Purified Tuberculin (PT VII).

1 T. U.=1/100 mg. of the International Standard Old Tuberculin.

A great advantage of expressing the doses of tuberculin by units and not by weight is that units are easier for personnel to remember in practical testing. In Denmark we use two doses of tuberculin for the Mantoux test, the first doses being 1 or 3 T. U., the final doses always being 100 T. U.

The expression of doses in T. U.'s is only possible on the basis of a careful standardization of the tuberculin employed.

SUMMARY AND CONCLUSIONS

The necessity for standardization of tuberculins is stressed. Only by using well-standardized tuberculins is it possible to compare surveys made at different times in one place or in different places of the world.

For tuberculins used for intracutaneous tests in man, the standardization must be based upon methods employing intracutaneous reactions in human tuberculin reactors.

A detailed description is given of the method of standardization employed in the State Serum Institute in Copenhagen.

As purified tuberculins cannot be standardized directly against old tuberculin, an international standard for purified tuberculin must be established.

It is desirable that doses of standardized tuberculins be expressed in tuberculin units (T. U.'s).

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THE INHERENT EFFICIENCY OF THE X-RAY METHODS USED IN THE DETECTION OF TUBERCULOSIS [1]

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INTRODUCTION

It was not long after the introduction of mass radiography of the chest that sharp differences of opinion arose concerning the relative efficiency of the various types of film used in the detection of pulmonary disease. Some physicians were convinced that 4- by 5-inch films were superior to all others; some were sure that 35-mm. films were equally satisfactory; others favored the use of 14- by 17-inch sensitized paper; and still others preferred fluoroscopy. With the recent introduction of 70-mm. film, additional differences of opinion have already been expressed.

The efficiency with which a particular radiographic method achieves the detection of pulmonary disease is limited by two principal factors:

(1) All types of film may not record detail with sufficient clarity to reveal every pathologic lesion. Errors resulting from this failure to record detail may be termed *inherent errors* since they are governed by the film itself.

(2) The interpreter is not always able to recognize the presence of a lesion, even though it is clearly recorded by the film; that is, when abnormal pulmonary conditions are recorded on a series of films, some may be missed as a result of poor judgment, lack of concentration, or fatigue on the part of the reader. These errors of detection may be

[1] From the Tuberculosis Control Division, U. S. Public Health Service.

called *subjective errors*, since they are caused primarily by the failure of the interpreter.

Both types of error, inherent and subjective, are important in evaluating the efficiency of mass radiographic methods. The inherent error, however, has special significance for a comparison of the merits of a number of film types, for it is this error which is governed by the characteristics of the films. It is clear therefore that a knowledge of the inherent errors of the various mass radiographic films would be not only helpful but essential in resolving the problem of the comparative efficiency of the various types and sizes of films for tuberculosis case finding.

INHERENT ERROR AND RADIOGRAPHIC ABILITY TO RECORD DETAIL

The detail or clarity required of a particular type of film to detect chest pathology varies widely according to the nature of the lesions which must be revealed. Some lesions are large and require that the film have only a meager ability to record detail. Other lesions are so small that they are not recorded unless the film has exceptional qualities of reproduction. Other characteristics such as chemical composition and structure of the lesion affect the recording process. It follows, then, that in a random series of X-ray films of persons with chest pathology, there must exist a relation between radiographic detail and the percentage of lesions detected, such as that illustrated in figure 1. The shape of the curve will be governed by the type and extent of the pathology present in the persons studied, since the char-

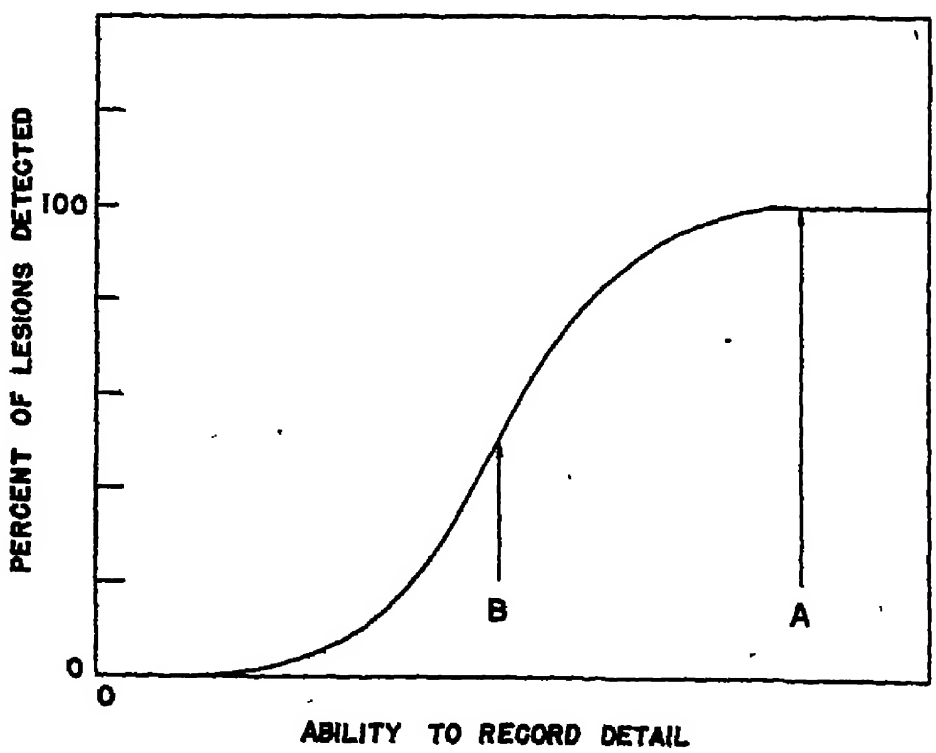

FIGURE 1.—Hypothetical relation between radiographic ability to record detail and the percentage of lesions detected.

acteristics of pulmonary lesions vary from one disease entity to another and from one stage to another within a given pathological group; that is, the shape of the curve would differ for silicosis, minimal tuberculosis, and far-advanced tuberculosis.

Now, if it were possible, by experimental methods on truly representative population groups, to derive curves similar to that shown in figure 1 for the three stages of tuberculosis, and if one were able to measure the abilities of radiographic films to record detail, the inherent efficiency of any film could be quickly evaluated for tuberculosis case finding. For example, if a film had an ability to record detail equal to "A" (fig. 1), its inherent efficiency would be 100 percent, since it would have had sufficient ability to record all of the lesions impressed upon it. On the other hand, if the film's ability to record detail were equal to "B," its inherent efficiency would be approximately 50 percent.

The ability of an X-ray film to record detail (*1*) may be evaluated quantitatively by radiographing on it a test object having a pattern that can be varied from a fine to a coarse configuration. Until recently, the test object most frequently used consisted of a mandril on which were wound wires of various size. The wires produce on the film a series of serrated patterns whose configurations vary with the sizes of the wires. When the pattern is coarse (i. e., one or two serrations per millimeter), little difficulty is encountered by most films in faithfully recording the pattern. As the pattern becomes finer, however, a limit is eventually reached beyond which the serrations can no longer be resolved by the film. The films which have poor ability to record detail reach the limit of resolution when the serrated pattern is still relatively coarse. The films that have excellent ability to record detail approach this limit only after the pattern has become very fine. By determining the maximum number of serrations per millimeter which the films are capable of resolving, one obtains a measure of the films' ability to record detail. Such a measure is customarily referred to as resolving power and is specified in terms of serrations per millimeter when the film is investigated with the wire-wound test object. More recently, it has become possible to measure resolving power by means of a linear type of test object (*2*). This has permitted the expression of X-ray-film resolving powers in terms of lines per millimeter, the same terms as used in photography.

To establish the relation between the radiographic ability to record detail (resolving power), and the percentage of tuberculous lesions that are detectable, it is necessary to collect a large group of persons with tuberculous pathology representative of that existing in the general population and to X-ray each of these persons with numerous

radiographic techniques that differ widely in their abilities to record detail. Strictly speaking, there does not exist a sufficient number of techniques to meet the latter requirement. However, the requirement can be fulfilled from a practical standpoint by using a very simple phenomenon of optical physiology. A brief discussion of this phenomenon follows.

The clarity with which the roentgen image of an anatomical structure can be perceived is determined by either (*a*) the ability of the radiographic film or (*b*) the ability of the observer's eye to record detail, whichever is poorer. Now the ability of the eye to record detail varies inversely, within certain limits, with the distance between the eye and the film viewed. That is, when a film on which is reproduced the series of linear patterns shown in figure 2 is observed at a number of viewing distances, the maximum number of lines per millimeter which the eye can resolve becomes progressively smaller as the viewing distance is lengthened. For example, at a viewing

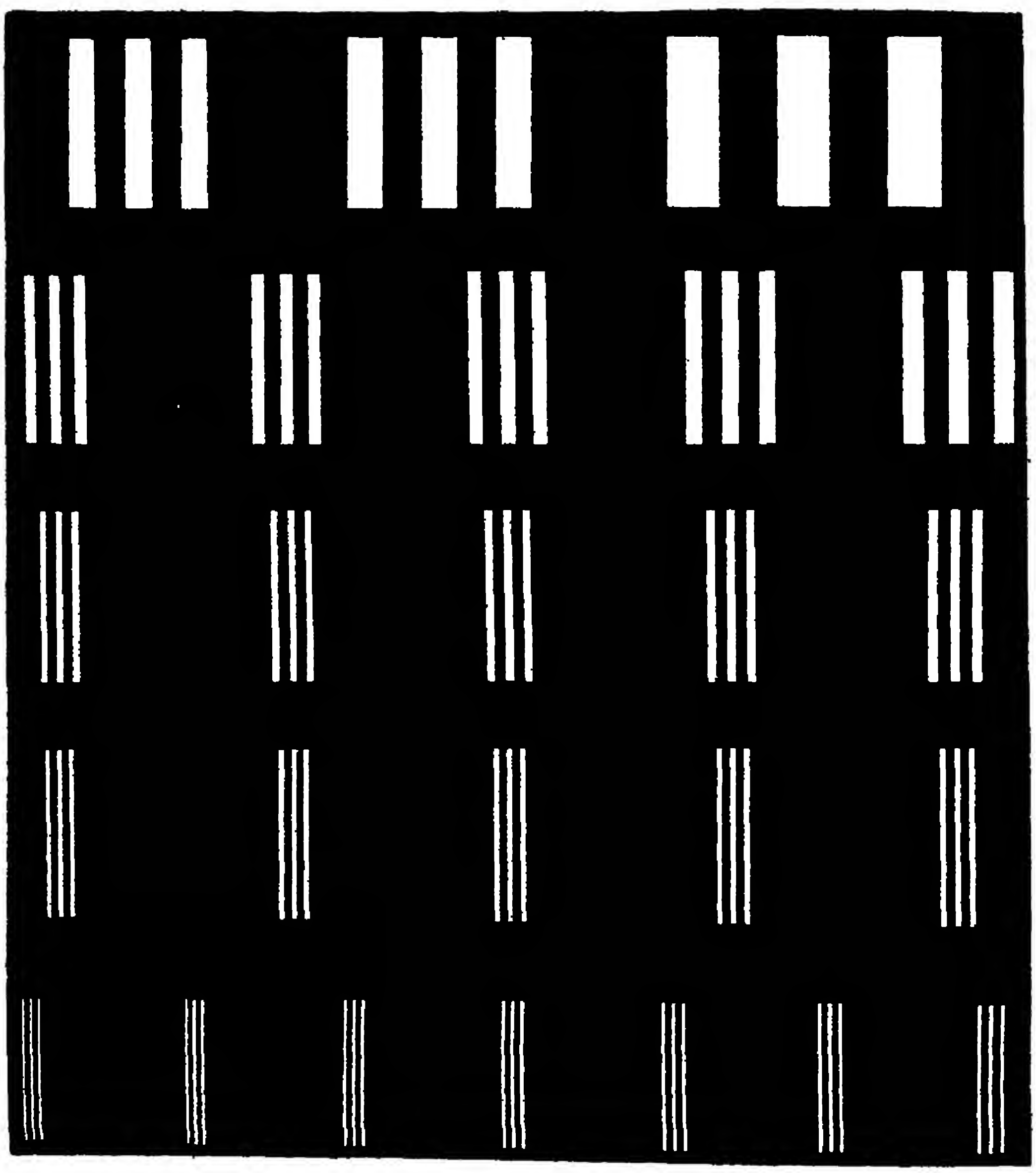

FIGURE 2.—Line drawing test—object with which the resolving power of the eye may be tested

distance of 1 meter, the maximum resolving power of the normal eye is approximately 2 lines per millimeter, whereas at 10 meters, the maximum resolving power of the eye falls to 0.2 lines per millimeter. Therefore, if a film having a resolving power of 10 lines per millimeter is viewed by an observer at a distance of 1 meter, the detail which can be seen is considerably less than that inherently recorded by the film. In fact, the detail perceived by the eye is the same as though the film had a resolving power of 2 lines per millimeter and was viewed under conditions in which the eye was not a limiting factor.

It is evident from the foregoing that the desired relation between radiographic detail and the percentage of tuberculous lesions detectable can be obtained if the following two conditions are met. First, the group of persons with tuberculous pathology is radiographed by films having sufficient inherent ability to detect all of the lesions that are present, and second, the films are read at a number of viewing distances. These distances must range from that at which the resolving power of the eye is equal to the resolving power of the films, to that at which the eye is unable to detect any of the lesions. In other words, by changing the viewing distance at which the films are observed, one achieves the same effect as though films of different resolving power were read at the usual viewing distance.

TECHNIQUE FOR MEASURING INHERENT EFFICIENCY OF VARIOUS RADIOGRAPHIC METHODS

A series of 50 roentgenograms of the chest (14- by 17-inch) which exhibited lesions characteristic of minimal tuberculosis (*3*) was collected. The films constituted a random sample taken from a group of several thousand roentgenograms of persons in whom disease had been discovered in mass radiographic surveys of apparently normal persons. The sizes of lesions varied from approximately 0.5 centimeter in diameter to a size sufficient to occupy one-third of one lung field. Thus, the sizes of the lesions were a random distribution of what is found in mass surveys of the adult population.

The 50 roentgenograms with abnormal findings were mixed with an equal number of negative films, and all the roentgenograms were then read at each of a number of viewing distances, from 100 to 1 meters. The reading was performed at night in an enclosed hallway, and the illumination was limited to that emanating from the view box on which the films were read. Visual acuity was thereby unaffected by the presence of extraneous sources of light. The view box contained fluorescent lamps of the standard type and had a surface brilliance of approximately 100 millilamberts.

The three readers started viewing the films at the maximum distance, each one calling out the presence or absence of an abnormal

shadow to the recorder. If there was any disagreement, the interpretation previously made at the normal viewing distance by an independent radiologist was stated, and a final decision was made on whether or not the lesion could be seen. Only in a few instances was it necessary to take the majority opinion of two of the three interpreters for the final decision.

This procedure was used because the purpose of the study was limited to a determination of whether or not a lesion could actually be seen at various distances. The study did not attempt to determine how easily a lesion could be seen or how often independent readers would be able to detect lesions without "before" or "after" knowledge of their presence. Independent readings by individual readers to determine the subjective errors were not done because another exhaustive study to answer that question is now in progress in the Tuberculosis Control Division.

When the series of readings was completed, the percentage of lesions detected at each viewing distance was calculated. The entire procedure was then repeated, using first, a series of 50 roentgenograms that exhibited lesions characteristic of moderately advanced tuberculosis (*3*), second, a series of 50 roentgenograms that exhibited lesions characteristic of far-advanced tuberculosis. The data for each of the series studied were then plotted as a function of the viewing distance, as shown in figure 3. At each viewing distance at which the films were read, the maximum resolving power of the readers' eyes

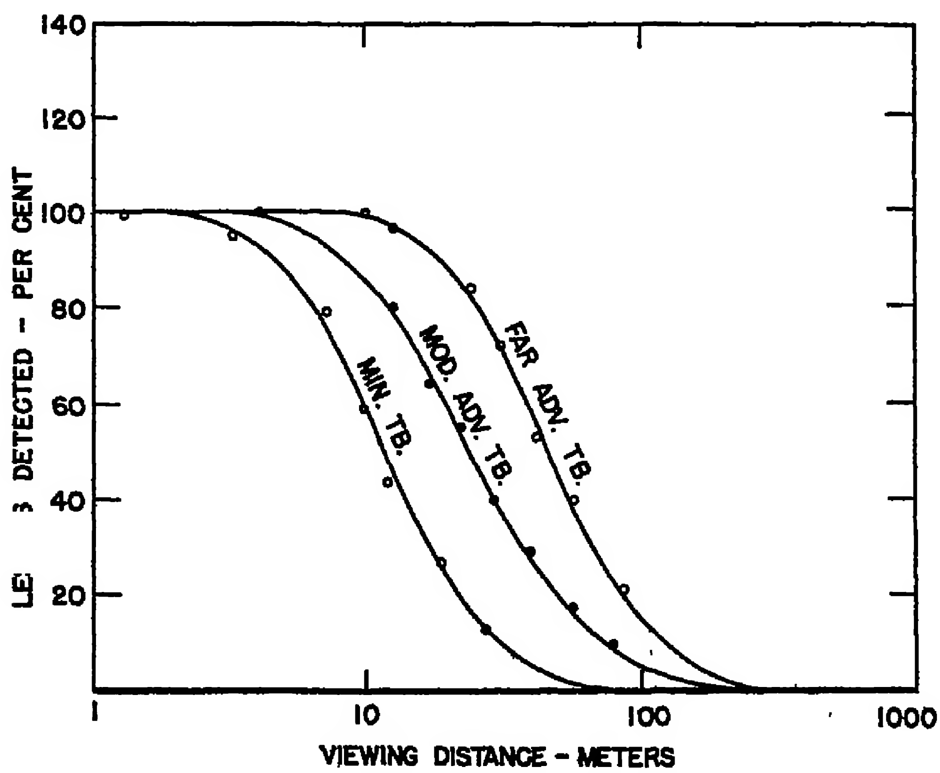

FIGURE 3.—Experimentally derived curves showing the percentage of minimal, moderately advanced, and far-advanced tuberculosis that can be detected at viewing distances ranging from 1 to 1,000 meters from 14- by 17-inch roentgenograms of the chest.

was measured by means of the resolving-power test object shown in figure 2. It became possible, therefore, to plot the data as a function of the maximum resolving power of the eye, as illustrated in figure 4.

It will be noted that the several curves are symmetrically sigmoid and that a higher level of maximum resolving power is required for the detection of a particular percentage of lesions when the lesions are minimal than when they are more advanced. This, of course, is to be expected. Furthermore, a high detection level is reached for all types of lesions at a maximum resolving power considerably below

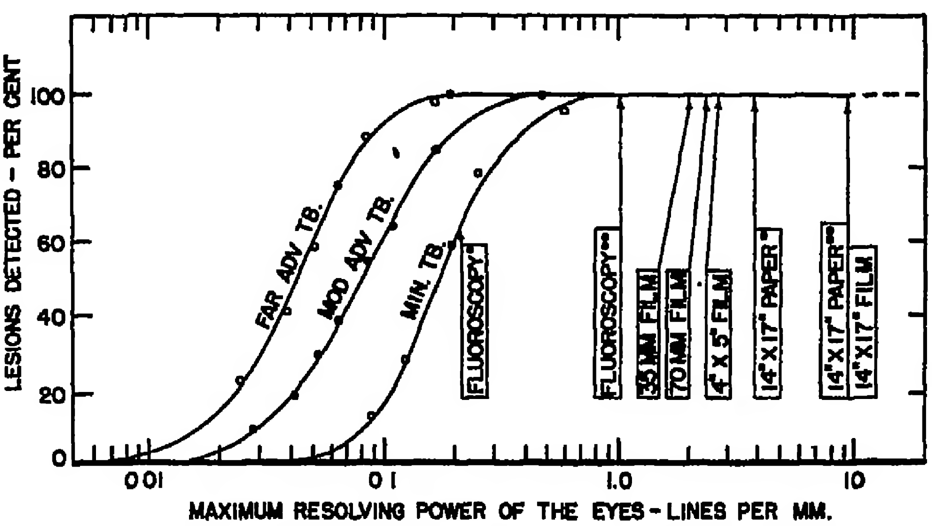

FIGURE 4.—Experimentally derived curves showing the relationships between the maximum resolving power of the eye and the percentages of minimal, moderately advanced, and far-advanced tuberculous lesions that can be detected by normal sight. The maximum resolving-power levels of 14- by 17-inch celluloid film, 14- by 17-inch sensitized paper, 4- by 5-inch, 70-millimeter and 35-millimeter photofluorographic film and fluoroscopy are shown at their respective positions. Two levels are indicated for 14- by 17-inch sensitized paper and fluoroscopy; those marked ** indicate the maximum resolving power for high-contrast patterns, whereas those marked * indicate the effective maximum resolving power for low-contrast pattern.

the inherent resolving power of 14- by 17-inch roentgenograms.[5] Therefore, we may be reasonably certain that the curves are truly representative and are not distorted by the exclusion from the several series of test roentgenograms of significant lesions too small for detection by 14- by 17-inch films.

As previously stated, the inherent efficiency of any radiographic technique in tuberculosis case finding may be easily evaluated from the data presented in figure 4. Before proceeding to a discussion of the procedure by which the calculations may be made, it is necessary to point out that the resolving power of a radiographic film is a function of the contrast of the elements comprising the image of the test object with which the resolving-power measurements are made. Resolving power is relatively poor at low-contrast levels. When contrast is increased, resolving power also increases, quickly at first, then less rapidly until a contrast level is reached at which resolving power

[5] 14- by 17-inch roentgenographic films exposed with conventional Patterson Par Speed screens have a maximum resolving power of 10 lines per millimeter (8).

assumes a maximum value and beyond which it remains essentially constant. This relationship is illustrated graphically in figure 5. It will be noted that at high-contrast levels, the resolving power of a film is simply equal to the film's maximum resolving power and is unaffected by contrast. At low contrast, however, the resolving power is essentially proportional to the product of the maximum resolving power and contrast.[6]

How effective 4- by 5-inch, 70-millimeter, and 35-millimeter

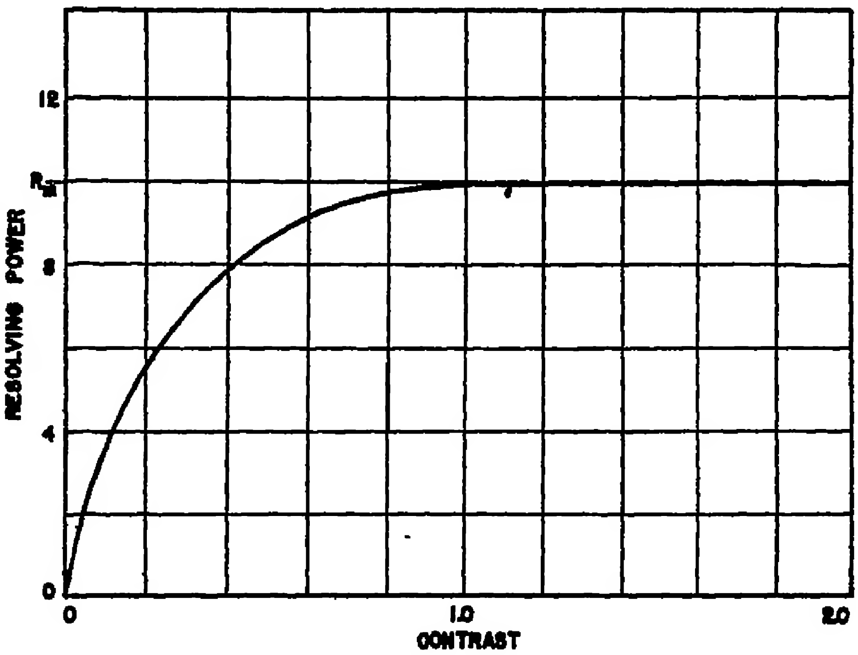

FIGURE 5.—Relationship between the resolving power of a radiographic film and the contrast exhibited in the image elements of the test pattern used to make the resolving-power measurements.

photofluorographic films are in the discovery of tuberculous pathology may be determined directly from figure 4, because it so happens that all three types of film, when exposed under normal photofluorographic conditions, record roentgen patterns with almost the same contrast as that of 14- by 17-inch films. Therefore, differences in the clarity with which these patterns are recorded by the several films are a consequence of differences in their maximum resolving-power values alone. Values of the maximum resolving power of 4- by 5-inch, 70-millimeter, and 35-millimeter photofluorographic films, determined by the Radiology Section of the Tuberculosis Control Division are, respectively, 2.75, 2.50, and 2.00 lines per millimeter. From an inspection of figure 4, it is evident that all three types of film have a sufficiently high maximum resolving power to detect the various types of tuberculous pathology represented

[6] Equation 1:

$R = aR_mC$, where

R_m is the film's maximum resolving power,

C is contrast, and

a is a proportionality constant.

in the random series, with an accuracy equal to that of single 14- by 17-inch celluloid roentgenograms.

The place of 14- by 17-inch paper film in the scale of efficiency of detection may also be evaluated from figure 4. However, since paper film has an inherent contrast factor approximately 40 percent of that of 14- by 17-inch celluloid film, the calculation is not as direct as was the case with photofluorographic films. It has been shown in figure 5 that the clarity with which a high-contrast pattern is reproduced is simply proportional to the maximum resolving power of the film. Therefore, when one deals solely with roentgenographic patterns of high contrast, the influence of contrast on image quality and, as a result, on efficiency of detection need not be considered. Moderately and far advanced tuberculous lesions as seen on a roentgenographic film consistently exhibit high contrast. Accordingly, in order to determine the efficiency of detection of 14- by 17-inch paper film for such pathology, it is necessary only to measure the maximum resolving power of the film and find from figure 4 the efficiency at that level. The maximum resolving power of 14- by 17-inch paper film when exposed with conventional intensifying screens is 10 lines per millimeter. Therefore, paper films are easily capable of detecting all moderately and far-advanced tuberculosis lesions.

It has been shown in the equation (see footnote 6) that the clarity with which a low-contrast image is reproduced is not only proportional to the maximum resolving power of the film but also to the contrast of the image. Since the contrast of all roentgenographic images made on paper film is 40 percent less than that of the images appearing in 14- by 17-inch celluloid film, the clarity of paper film when recording low-contrast images is reduced. Indeed, it is clear from the equation that the clarity is reduced to the same extent as if the maximum resolving power of paper film were 40 percent that of celluloid film and as if the two films' respective contrasts were equal to one another. Such a resolving power is 4 lines per millimeter (i. e., 40 percent of 10 lines per millimeter).

Minimal tuberculous lesions usually are of low contrast and, therefore, the efficiency of detection of paper film for such pathology should be determined on the basis of a maximum-resolving-power level of four lines per millimeter. It is evident from figure 4 that paper film is inherently capable of detecting minimal tuberculosis.

Although fluoroscopy has not been used widely as a tuberculosis case-finding method, it may be of interest to some to determine the place of this procedure in the scale of efficiency of detection. The maximum resolving power of the Patterson type "B" fluoroscopic screen has been measured at 6 lines per millimeter. However, under normal fluoroscopic conditions, the eye cannot appreciate such clarity

of image reproduction. In chest fluoroscopy, the screen illumination has a value of approximately 2 microlamberts and, according to data published by Hecht (*4*), visual acuity at this level is approximately 7 percent of its value under normal lighting conditions (10 to 1,000 millilamberts). Usually, fluoroscopic screens are viewed at distances of 15 to 20 cm. Under normal lighting conditions, the maximum resolving power of the eye at these distances is approximately 14 lines per millimeter. Therefore, under fluoroscopic conditions, the resolving power is only 1.0 line per millimeter. By following the same line of reasoning as employed in the discussion of paper films, it is clear that moderately and far-advanced tuberculosis may be easily detected by fluoroscopy. In regard to fluoroscopy's efficiency of detection for low-contrast patterns (minimal tuberculosis), it may be shown experimentally that the contrast of fluorsocopic images is approximately two-thirds that of the images appearing in a 14- by 17-inch celluloid film.

Furthermore, there is evidence (*5*) that the proportionality constant, a, in equation 1 (see footnote 6) has a value considerably lower under fluoroscopic conditions (low illumination) than under radiographic conditions (high illumination). Indeed, its value at chest fluoroscopic levels is of the order of one-third that occurring under normal illumination. Therefore, the clarity with which low-contrast fluoroscopic images are reproduced is comparable to that of a radiographic image recorded by a film that has a maximum resolving power of 0.2 line per millimeter and a contrast equal to that of 14- by 17-inch celluloid film (i. e., one-third of two-thirds of 1.0 line per millimeter). It is clear from figure 4 that such a resolving power is less than that needed for the detection of all minimal tuberculous lesions (low-contrast patterns). In fact, a diagnostic error approaching 40 percent may be predicted in the detection of minimal tuberculosis by fluoroscopy. It must be pointed out at this time that this error is an inherent error of fluoroscopy and is caused by the inability of the eye to record sufficient detail to detect abnormal changes. Accordingly, it cannot be improved by more painstaking examinations or by more competent examiners.

To some chest specialists and radiologists, such a high diagnostic error in the fluoroscopy of minimal tuberculosis may seem incredible. However, one of us (I. L.) has recently completed a survey in which over 50 patients with minimal tuberculosis were examined fluoroscopically. The patients were studied in much the same manner as those whose films were used in the study described above. In no instance, however, did the fluoroscopist examine a patient previous to a period of dark adaptation of 30 minutes. The efficiency of detection obtained during this survey was 69 percent, a diagnostic error of 31 percent. This is in excellent agreement with the predicted value given above.

It is clear, therefore, that fluoroscopy is rather poor as a tuberculosis case-finding procedure from the standpoint of its efficiency in detecting minimal tuberculosis.

SUMMARY

1. A simple method of studying the inherent diagnostic error of all mass chest radiographic methods is described and experimental results are presented.

2. Fluoroscopy is found to be not wholly satisfactory in this study for detecting minimal tuberculous lesions.

3. By correlating the percentage of X-ray lesions detected with the maximum resolving power of the eye at various distances, it is shown that 35-millimeter, 70-millimeter, 4- by 5-inch celluloid, and 14- by 17-inch sensitized paper are all inherently capable of detecting random samples of minimal, moderately advanced, and far-advanced tuberculous lesions with a high degree of accuracy.

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(5) Work done in Radiology Section, Tuberculosis Control Division, soon to be reported.

Review [1] of

THE IMMUNIZING VALUE OF THE BCG DRY GLUCOSE VACCINE [2]

In February 1946, the American Review of Soviet Medicine published "The Immunizing Value of the BCG Dry Glucose Vaccine," [2] a report of experiments begun in 1937, by Leshchinskaya and Vakengut of the BCG laboratory, Central Institute of Experimental Medicine, Union of Soviet Socialist Republics.

The article begins with a brief discussion of the difficulties encountered by the Soviet Union in carrying out mass BCG vaccination against tuberculosis. The perishability of the vaccine precludes its use in some districts, and its production in those districts is impeded by the lack of qualified personnel. A general history of attempts to preserve the vaccine by drying is then presented.

A summary of reports (1941, 1942) is given, describing the results

[1] From the Office of the Chief, Tuberculosis Control Division, Bureau of State Services, U. S. Public Health Service.

[2] By Leshchinskaya, E. N. First published in Problemy tuberculeza No. 6, pp. 55–59 (1944).

of experiments by Leshchinskaya and Vakengut. The experiments led to the following conclusions:

1. BCG bacilli retain their vitality better in a 50-percent glucose solution than in such media as serum, saccharose, and gum arabic.

2. The death of the bacilli is most pronounced during the first months of drying (vacuum method), and later the number of colonies obtained upon inoculation remains constant for several months.

3. The dried vaccine may be stored at room temperature. (After 9 months, the seeding of 0.001 mg. of the culture still yielded growth of individual colonies.)

4. Refrigeration is the best method for storing.

5. Dry glucose vaccine emulsifies readily.

From these experiments, a standard sterile preparation was obtained in which the vitality of the bacilli was conserved for a considerable period. The immunizing ability of the dry glucose vaccine, following various periods of storage, remained to be checked.

The remainder of the article describes the checking experiment, which may be reported as follows:

Preparation of the vaccine.—A 14-day-old BCG culture of a Leningrad strain, grown on Sauton's medium, was used to prepare the vaccine on June 17, 1941. The culture was filtered, pressed between filter paper, weighed, and emulsified in a jar with beads. A small quantity of 50-percent glucose solution was added. For a final planting, the same solution was used—0.01 gm. of culture per cubic centimeter of emulsion. The preparation, in 5-cc. ampoules, was dried (variation of Flosdorf and Mudd method) after freezing at −18° C. The ampoules were sealed 24 hours later under a high vacuum.

Viability of the dry vaccine.—In September 1942, the first inoculations were made with the dry vaccine, which had been stored in summer at 20° C. to 25° C. and in winter at −25° C. to −30° C. A seeding of 0.001 mg. of culture on Petragnani medium yielded a growth that averaged 70 colonies per tube. In all cases, even 0.00001 mg. led to the growth of individual colonies. The growth of bacilli in dry BCG, after 16 months of storage, is approximately equal to the growth in liquid vaccine preserved for 2 months.

Tests were made on guinea pigs to determine the immunizing action of the dry vaccine after storage for 16 months. Twenty-two guinea pigs were used, divided into 3 groups:

(1) 12 guinea pigs inoculated with the dry BCG.
(2) 5 inoculated with fresh liquid BCG.
(3) 5 controls.

The guinea pigs weighed 200–300 gm. and gave a negative Mantoux reaction. Each BCG inoculation consisted of 1 mg. of culture. Six weeks after inoculation, the guinea pigs that had received BCG were

given the Mantoux test, and all were positive except one in the first group. Another in the first group gave a doubtful reaction.

Two months and ten days after inoculation, the 22 guinea pigs were infected with virulent tubercle bacillus culture (Vallea). The animals were observed for 4 months. (The article indicates that one animal in the first group and three in the second group died during the observation period.) One of the animals in the third group had died. At 4 months, eight guinea pigs in the first group, two in the second, and four in the third were killed, and the internal organs and lymphatic glands were examined according to the method of Weisfeiler. Diagnosis was confirmed by histologic examination in the Central Institute for Tuberculosis.

Effect of virulent culture (Vallea) upon vaccinated and control animals examined

Guinea pig No.	Group	Changes at site of injection	Glandular changes: Inguinal glands: Left	Glandular changes: Inguinal glands: Right	Glandular changes: Other glands	Liver	Spleen	Lungs	Severity of pathology
2	1	----	++++	----	++	++	----	----	Moderate.
3	1	----	++++	+	----	----	----	----	Slight.
4	1	----	++++	----	----	----	----	----	Slight.
5	1	+	++	----	----	----	----	----	Slight.
7	1	----	+++	+	+	----	----	----	Slight.
9	1	----	+++	----	+++	++	+++	++	Moderate.
10	1	----	++++	----	++	----	----	----	Slight.
11	1	----	++	----	----	++	++	----	Moderate.
14	2	----	++	----	+	+	++	----	Moderate.
15	2	----	----	----	----	----	+	----	Slight.
23	3	Large ulcer	++++	++++	++++	++++	++++	++++	Serious.
24	3	Two ulcers	++++	++++	++++	++++	++++	++++	Serious.
25	3	Large ulcer	++++	++++	++++	++++	++++	++++	Serious.
26	3	Scar	++++	----	++++	++	++++	++++	Serious.

Symbols:

Evaluation of effect on glands:
+ = Enlargement to 0.5 cm. in diameter.
++ = Enlargement to 1.0 cm. in diameter.
+++ = Enlargement to 1.5 cm. in diameter.
++++ = Enlargement to over 1.5 cm. in diameter.

Evaluation of effect on organs:
+ = Slight tubercle, suspicious of tuberculosis, or 1–2 tubercles on surface.
++ = 3–6 tubercles on surface.
+++ = 7–15 tubercles on surface.
++++ = over 15 tubercles on surface.

The dry glucose vaccine, as tested by animal vaccination after preservation for 1½ years, differed very little from fresh liquid vaccine in its immunizing ability. The preparation, obtained as described, is sterile and may be recommended for practical use. Dry BCG vaccine will make it possible to centralize production, to increase vaccination, and to extend it to outlying areas of the Union of Soviet Socialist Republics.

CORRECTION

The article, "A Crystalline Antibacterial Substance from the Lichen *Ramalina Reticulata*," by Alfred Marshak, Public Health Reports, vol. 62, No. 1, Jan. 3, 1947, contained two errors in the captions of figures 2 and 4. The caption for figure 2, page 15, should read as follows: Inoculated with tubercle bacilli, treated with oil-Tween-80 only. Group III. The caption for figure 4, page 16, should read as follows: Not inoculated with tubercle bacilli, treated with oil-Tween-80 only. Group IV.

DEATHS DURING WEEK ENDED JAN. 11, 1947

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Jan. 11, 1947	Corresponding week, 1946
Data for 93 large cities of the United States:		
Total deaths	10,688	11,670
Median for 3 prior years	11,659	
Total deaths, first 2 weeks of year	20,847	23,598
Deaths under 1 year of age	861	611
Median for 3 prior years	661	
Deaths under 1 year of age, first 2 weeks of year	1,675	1,305
Data from industrial insurance companies:		
Policies in force	67,231,066	67,121,498
Number of death claims	11,568	13,288
Death claims per 1,000 policies in force, annual rate	9.0	10.3
Death claims per 1,000 policies, first 2 weeks of year, annual rate	8.4	10.3

INCIDENCE OF HOSPITALIZATION, AUGUST–DECEMBER, 1946

Through the cooperation of the Hospital Service Plan Commission of the American Hospital Association, data on hospital admissions among members of Blue Cross Hospital Service Plans are presented monthly. These plans provide prepaid hospital service. The data cover hospital service plans scattered throughout the country, mostly in large cities.

Item	December		November		October		September		August	
	1946	1945	1946	1945	1946	1945	1946	1945	1946	1945
1. Number of plans supplying data	82	81	82	78	80	78	83	79	80	81
2. Number of persons eligible for hospital care (in thousands)	23,903	18,915	21,898	18,841	21,118	18,676	22,800	18,581	20,532	18,500
3. Number of persons admitted for hospital care	212,009	145,954	200,835	162,954	203,329	172,938	201,098	157,675	194,170	176,672
4. Incidence per 1,000 persons, annual rate during current month (daily rate×365)	104.4	90.8	111.6	105.3	113.4	109.0	107.8	103.3	111.3	112.4
5. Incidence per 1,000 persons, annual rate for the 12 months ending with current month	111.2	106.7	110.2	106.4	109.7	106.2	109.2	105.6	109.1	105.5
6. Number of plans reporting on hospital days	33	27	31	29	30	26	30	29	28	31
7. Days of hospital care per case discharged during month [1]	8.22	8.98	8.07	8.70	8.23	8.38	7.98	7.86	7.93	7.61

[1] Days include entire stay of patient in hospital whether at full pay or at a discount.

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INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JANUARY 18, 1947

Summary

The reported incidence of influenza declined during the week. A total of 4,129 cases was reported, as compared with 4,728 last week, 21,110 for the corresponding week last year, and a 5-year (1942–46) median of 4,387. Only 5 States reported currently more than 105 cases—Texas (1,788), South Carolina (713), Virginia (596), Arizona (259), and Oklahoma (114). Only 4 other States reported more than 46 cases. The total for the first 3 weeks of the year is 12,522 (less than for the corresponding period of any of the past 4 years), as compared with 101,786 for the same period last year and a 5-year median of 12,712.

Of the total of 69 cases of poliomyelitis (as compared with 91 last week, 51 for the corresponding week last year, and a 5-year median of 27), 21 occurred in California (last week 19) and 5 each in Illinois and Michigan. The total for the first 3 weeks of the year is 256, as compared with 105 for the 5-year median and 162 for the corresponding period last year. The last named figure was the largest number previously recorded for a corresponding period since 1928, when the number was 185.

Totals for the first 3 weeks of the year for certain other diseases are as follows (last year's figures in parentheses): Diphtheria 988 (1,320), dysentery, amebic, 77 (135), dysentery, bacillary 1,093 (1,164), dysentery, undefined 664 (436), infectious encephalitis 20 (22), measles 10,949 (13,573), meningococcus meningitis 266 (693), scarlet fever 6,844 (7,816), smallpox 13 (22), tularemia 154 (87), typhoid and paratyphoid fever 127 (129), endemic typhus fever 155 (191), undulant fever 250 (186), whooping cough 6,582 (5,504).

Deaths recorded for the week in 93 large cities of the United States totaled 9,960 as compared with 10,638 last week, 10,401 and 9,656, respectively, for the corresponding weeks of 1946 and 1945, and a 3-year (1944-46) median of 10,401. The total for the first 3 weeks of the year is 30,807, as compared with 33,999 for the corresponding period last year.

Telegraphic morbidity reports from State health officers for the week ended Jan. 18, 1947, and comparison with corresponding week of 1946 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended— Jan. 18, 1947	Week ended— Jan. 19, 1946	Median 1942-46	Week ended— Jan. 18, 1947	Week ended— Jan. 19, 1946	Median 1942-46	Week ended— Jan. 18, 1947	Week ended— Jan. 19, 1946	Median 1942-46	Week ended— Jan. 18, 1947	Week ended— Jan. 19, 1946	Median 1942-46
NEW ENGLAND												
Maine	2	1	0	3	2	2	190	5	29	0	0	2
New Hampshire	0	0	0	2	------	------	------	7	7	0	0	0
Vermont	0	2	0	42	77	------	179	12	12	0	0	0
Massachusetts	10	6	3	------	------	------	431	209	284	4	10	8
Rhode Island	0	0	0	------	2	1	44	------	17	0	1	1
Connecticut	0	2	2	2	22	8	215	39	65	2	1	2
MIDDLE ATLANTIC												
New York	21	18	18	[1] 13	[1] 43	[1] 15	209	573	573	11	26	27
New Jersey	9	1	5	5	56	18	85	55	167	6	9	8
Pennsylvania	13	25	10	4	16	4	640	656	1,107	3	18	12
EAST NORTH CENTRAL												
Ohio	9	30	8	7	35	29	330	18	82	2	13	9
Indiana	5	17	8	3	76	16	24	61	67	1	2	7
Illinois	0	4	8	2	22	22	85	438	177	2	13	13
Michigan [2]	15	18	15	1	18	5	46	430	176	0	5	5
Wisconsin	3	1	3	46	196	101	71	60	179	3	4	3
WEST NORTH CENTRAL												
Minnesota	6	8	3	------	8	2	30	7	16	2	3	8
Iowa	0	6	3	1	------	1	10	329	95	4	0	1
Missouri	1	8	8	4	33	12	2	113	80	4	9	9
North Dakota	0	6	2	34	28	28	1	------	14	0	2	1
South Dakota	0	0	0	------	------	------	16	33	33	0	0	0
Nebraska	0	2	1	18	61	51	14	13	13	1	2	2
Kansas	14	8	2	67	818	17	9	187	185	0	1	5
SOUTH ATLANTIC												
Delaware	0	0	1	------	------	------	2	4	6	0	0	1
Maryland [2]	15	26	7	5	26	26	158	33	33	2	2	4
District of Columbia	0	0	0	------	3	3	21	10	17	0	0	2
Virginia	10	23	8	596	1,835	763	67	172	172	1	11	11
West Virginia	6	4	4	51	488	88	------	25	25	2	8	3
North Carolina	7	21	17	------	------	27	169	23	59	0	3	7
South Carolina	1	6	6	718	1,811	775	46	53	53	1	1	1
Georgia	9	8	7	14	170	101	150	41	41	0	3	3
Florida	6	9	7	20	8	8	7	21	26	4	3	3
EAST SOUTH CENTRAL												
Kentucky	13	6	6	2	72	21	2	226	38	1	6	5
Tennessee	6	17	6	39	187	81	35	50	50	1	14	6
Alabama	5	4	6	50	2,164	433	8	11	21	2	4	4
Mississippi [2]	5	8	6	------	------	------	------	------	------	1	3	3
WEST SOUTH CENTRAL												
Arkansas	9	15	10	105	490	186	58	38	52	4	8	1
Louisiana	6	11	7	35	2,253	8	3	5	18	0	6	5
Oklahoma	0	8	8	114	461	188	6	20	20	0	3	3
Texas	26	39	58	1,788	6,437	2,094	71	215	215	6	10	10
MOUNTAIN												
Montana	0	1	1	9	102	85	135	13	54	0	1	0
Idaho	0	2	0	30	105	2	7	69	22	0	1	1
Wyoming	2	0	0	6	------	61	7	10	10	1	1	1
Colorado	6	4	4	15	93	77	25	109	158	0	0	0
New Mexico	1	3	3	1	86	6	18	------	10	0	1	1
Arizona	4	4	2	259	356	103	48	4	14	0	0	0
Utah [2]	0	0	0	5	1,976	105	8	52	38	1	2	2
Nevada	0	0	0	------	------	------	------	40	1	0	0	0
PACIFIC												
Washington	11	9	2	------	------	1	19	296	140	0	3	2
Oregon	4	6	1	14	136	53	25	35	72	2	7	4
California	22	35	20	9	343	112	73	670	387	9	20	20
Total	282	427	314	4,129	21,110	4,337	3,789	5,490	8,807	83	240	240
3 weeks	988	1,320	1,058	12,522	101,786	12,712	10,949	13,573	25,214	266	698	711
Seasonal low week [3]	(27th) July 5-11			(30th) July 26-Aug. 1			(35th) Aug. 30-Sept. 5			(37th) Sept. 13-19		
Total since low	8,554	12,964	10,086	45,497	464,034	47,838	33,836	39,897	63,227	1,237	2,197	2,197

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Dates between which the approximate low week ends. The specific date will vary from year to year.

Telegraphic morbidity reports from State health officers for the week ended Jan. 18, 1947, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever [4]		
	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46
	Jan. 18, 1947	Jan. 19, 1946		Jan. 18, 1947	Jan. 19, 1946		Jan. 18, 1947	Jan. 19, 1946		Jan. 18, 1947	Jan. 19, 1946	
NEW ENGLAND												
Maine	0	0	0	35	19	26	0	0	0	0	0	0
New Hampshire	0	0	0	8	3	12	0	0	0	0	0	0
Vermont	1	1	0	7	13	7	0	0	0	1	0	0
Massachusetts	0	0	0	172	178	328	0	0	0	4	2	1
Rhode Island	0	0	0	14	11	15	0	0	0	0	0	0
Connecticut	0	2	0	59	34	63	0	0	0	1	1	0
MIDDLE ATLANTIC												
New York	4	4	2	290	297	372	0	0	0	6	0	2
New Jersey	1	8	1	104	87	109	0	0	0	1	8	0
Pennsylvania	2	1	0	147	187	285	0	0	0	1	1	4
EAST NORTH CENTRAL												
Ohio	1	0	0	287	228	311	1	1	1	1	2	2
Indiana	0	1	1	83	89	107	2	0	2	0	0	1
Illinois	5	1	1	126	159	242	0	0	1	0	1	1
Michigan [1]	5	0	0	183	145	169	0	0	0	1	1	1
Wisconsin	0	0	1	95	123	175	0	0	0	1	0	0
WEST NORTH CENTRAL												
Minnesota	2	0	0	40	52	95	0	0	0	0	0	0
Iowa	1	4	0	33	42	63	0	0	0	0	4	1
Missouri	1	1	1	88	41	86	1	0	0	2	0	0
North Dakota	1	0	0	6	9	36	0	0	0	1	0	0
South Dakota	0	0	0	4	15	31	1	0	0	0	0	0
Nebraska	1	6	0	32	55	49	0	0	0	2	0	0
Kansas	3	1	0	77	71	79	0	0	1	0	0	0
SOUTH ATLANTIC												
Delaware	0	0	0	25	1	12	0	0	0	0	0	
Maryland [1]	1	0	0	48	56	68	0	0	0	1	2	
District of Columbia	0	0	0	12	12	28	0	0	0	0	0	0
Virginia	0	1	0	44	72	52	0	0	0	1	0	1
West Virginia	2	0	0	23	34	64	0	0	0	0	0	0
North Carolina	0	0	1	36	33	53	0	0	0	0	4	0
South Carolina	0	0	0	3	10	10	0	0	0	0	0	1
Georgia	0	0	0	18	7	17	0	0	0	0	2	2
Florida	2	1	0	8	5	5	0	0	0	1	1	1
EAST SOUTH CENTRAL												
Kentucky	0	0	0	44	35	56	0	0	0	0	1	1
Tennessee	3	0	0	30	50	78	0	0	0	2	1	1
Alabama	0	0	1	8	9	17	0	0	0	1	0	0
Mississippi [1]	4	2	0	8	13	13	0	0	1	2	1	0
WEST SOUTH CENTRAL												
Arkansas	1	2	0	4	14	11	0	1	0	0	0	0
Louisiana	0	6	2	5	11	11	0	1	0	4	4	4
Oklahoma	1	0	0	1	25	25	0	1	0	1	3	2
Texas	2	3	3	40	103	103	0	0	1	5	8	6
MOUNTAIN												
Montana	1	2	0	11	2	15	0	0	0	1	2	0
Idaho	1	0	0	13	10	15	0	8	1	0	2	1
Wyoming	0	0	0	6	6	7	0	0	0	0	0	0
Colorado	0	0	0	53	51	51	0	1	0	0	0	1
New Mexico	0	1	0	7	17	10	0	0	0	0	1	1
Arizona	0	0	0	14	2	8	0	0	0	0	4	2
Utah [1]	1	1	1	28	43	45	0	0	0	0	0	0
Nevada	0	0	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	1	2	2	30	57	57	0	0	0	0	0	0
Oregon	0	1	0	13	24	24	0	0	0	0	0	1
California	21	10	8	106	206	206	0	0	0	5	2	2
Total	69	51	27	2,428	2,711	3,981	5	18	18	46	48	57
3 weeks	255	162	105	6,844	7,816	10,749	13	22	37	127	130	155
Seasonal low week [3]	(11th) Mar. 15–21			(32d) Aug. 9–15			(35th) Aug. 30–Sept. 5			(11th) Mar. 15–21		
Total since low	[5]25,080	13,499	12,189	33,530	46,387	49,470	67	98	154	3,655	4,380	5,135

[1] Period ended earlier than Saturday.
[3] Dates between which the approximate low week ends. The specific date will vary from year to year.
[4] Including paratyphoid fever reported separately, as follows: Vermont 1; Massachusetts 3 (salmonella infection); New York 1; Ohio 1; California 2.
[5] Corrections: Virginia, delayed report, 2 cases, October and November onset; Nebraska, 6 December cases; Maine, diagnosis changed, 1 December case.

Telegraphic morbidity reports from State health officers for the week ended Jan. 18 1947, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Whooping cough: Week ended— Jan. 18, 1947	Whooping cough: Week ended— Jan. 19, 1946	Whooping cough: Median 1942-46	Week ended Jan. 18, 1947: Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis, infectious	Rocky Mt. spotted fever	Tularemia	Typhus fever, endemic	Undulant fever
NEW ENGLAND											
Maine	14	16	41								
New Hampshire	1	12	5				1				
Vermont	30	12	34								4
Massachusetts	226	111	111		1						2
Rhode Island	45	69	27								
Connecticut	59	42	47								1
MIDDLE ATLANTIC											
New York	251	258	258	4	5		2		1		3
New Jersey	139	164	144	1							2
Pennsylvania	225	141	220				1		1		3
EAST NORTH CENTRAL											
Ohio	101	92	134								
Indiana	36	24	16				3		2		4
Illinois	188	82	100	2	1				10		20
Michigan [2]	219	129	129	1					1		3
Wisconsin	135	71	98								2
WEST NORTH CENTRAL											
Minnesota	9	10	35	2							1
Iowa	7	7	22								14
Missouri	17	6	6								
North Dakota			3								
South Dakota	3	1	2								2
Nebraska	2	5	6								
Kansas	19	14	29						2		3
SOUTH ATLANTIC											
Delaware											
Maryland [2]	96	12	41						2		1
District of Columbia	1	10	10						1		
Virginia	89	70	70			28			8	1	
West Virginia		14	59						1		
North Carolina	23	58	135						4	5	
South Carolina	89	53	53	6	24				4		
Georgia	7	6	15	1					4	17	3
Florida	25	14	20							5	1
EAST SOUTH CENTRAL											
Kentucky	48	11	33						4		
Tennessee	28	20	20	1	1	1			5		1
Alabama	50	7	13							3	
Mississippi [2]									2	1	
WEST SOUTH CENTRAL											
Arkansas	5	3	15						8	4	
Louisiana	7		1						1	3	
Oklahoma	11	6	10	1					4		
Texas	252	146	146	2	309	5				16	11
MOUNTAIN											
Montana	3	2	16								1
Idaho	1	4	4			1					
Wyoming	1		5								
Colorado	1	32	32								4
New Mexico	3	12	12								
Arizona	20	14	19			37					
Utah [2]		15	15								1
Nevada		7	1				1				
PACIFIC											
Washington	32	61	47								3
Oregon	10	10	10								3
California	112	123	222	1	3					1	14
Total	2,485	1,976	2,418	22	344	67	8	0	60	56	97
Same week, 1946	1,978			67	309	178	8	0	85	49	78
Median, 1942-46	2,418			27	177	40	7	0	82	51	[3] 77
3 weeks: 1947	6,582			77	1,998	604	29	1	154	155	260
1946	5,504			185	1,164	456	22	0	87	191	186
Median, 1942-46	6,526			81	810	159	22	0	87	191	[3] 198

[2] Period ended earlier than Saturday.
[3] 2-year average, 1945-46.

WEEKLY REPORTS FROM CITIES [1]

City reports for week ended Jan. 11, 1947

This table lists the reports from 85 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
NEW ENGLAND												
Maine:												
Portland	2	0	------	0	54	0	2	0	3	0	0	3
New Hampshire:												
Concord	0	0	------	0	------	0	0	0	0	0	0	------
Massachusetts:												
Boston	6	0	------	0	16	4	8	0	29	0	1	37
Fall River	0	0	------	0	1	0	0	1	3	0	0	6
Springfield	0	0	------	0	3	0	1	0	5	0	0	16
Worcester	0	0	------	0	5	0	8	0	6	0	0	26
Rhode Island:												
Providence	2	0	1	0	22	0	5	0	4	0	0	8
Connecticut:												
Bridgeport	0	0	------	0	------	0	0	0	3	0	0	------
Hartford	0	0	------	0	1	0	2	0	5	0	0	------
New Haven	0	0	------	0	31	0	1	0	3	0	0	5
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0	------	2	------	0	7	0	10	0	0	3
New York	27	0	17	4	63	2	99	1	74	0	2	79
Rochester	0	0	------	0	7	0	6	0	14	0	0	1
Syracuse	0	0	------	0	------	0	4	0	5	0	0	24
New Jersey:												
Camden	0	0	------	0	------	0	0	0	4	0	0	4
Newark	0	0	4	0	6	2	5	0	13	0	0	20
Trenton	2	0	1	0	30	0	6	0	2	0	0	2
Pennsylvania:												
Philadelphia	0	0	3	1	24	1	17	0	22	0	0	53
Pittsburgh	0	0	1	1	222	0	8	0	8	0	0	12
Reading	0	0	------	0	8	0	2	0	1	0	0	5
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	0	0	------	0	2	0	2	0	11	0	0	4
Cleveland	0	0	5	1	220	1	7	0	31	0	0	15
Columbus	2	0	------	0	1	0	1	0	7	0	0	4
Indiana:												
Indianapolis	0	1	------	0	------	1	8	0	6	0	0	24
South Bend	0	0	------	0	------	0	0	0	2	0	0	------
Terre Haute	0	0	------	0	------	0	2	0	2	0	0	------
Illinois:												
Chicago	0	0	2	1	9	3	84	0	41	0	0	61
Michigan:												
Detroit	3	1	1	1	4	0	10	0	46	0	0	105
Flint	0	0	------	0	------	0	9	0	1	0	0	4
Grand Rapids	0	0	------	0	------	0	3	0	6	0	0	17
Wisconsin:												
Kenosha	0	0	------	0	------	0	0	0	3	0	0	------
Milwaukee	0	0	1	1	6	2	9	0	15	0	0	71
Racine	0	0	------	0	------	0	0	0	9	0	0	4
Superior	2	0	------	0	------	0	0	0	1	0	0	------
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0	------	0	------	0	0	1	4	0	0	------
Minneapolis	4	0	------	1	4	0	4	0	5	0	0	4
St. Paul	1	0	------	0	1	0	4	0	5	0	0	------
Missouri:												
Kansas City	0	0	------	0	4	0	11	0	4	0	0	5
St. Joseph	0	0	------	0	------	0	0	0	2	0	0	3
St. Louis	2	0	4	0	1	[illegible]	17	0	7	0	0	[illegible]

[1] In some instances the figures include nonresident cases.

City reports for week ended Jan. 11, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
WEST NORTH CENTRAL—continued												
Nebraska:												
Omaha	0	0		0		0	4	0	3	0	0	2
Kansas:												
Topeka	0	0		0		0	0	0	1	0	0	
Wichita	0	0		0	1	0	4	1	4	0	0	2
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0		0		0	1	0	2	0	0	5
Maryland:												
Baltimore	10	0	2	1	10	2	8	0	17	0	0	56
Cumberland	0	0		0		0	0	0	0	0	0	
Frederick	0	0		0		0	1	0	0	0	0	
District of Columbia:												
Washington	0	0	3	1	19	0	6	0	16	0	0	9
Virginia:												
Lynchburg	0	0		0		0	2	0	2	0	0	
Richmond	2	0	1	1	41	1	3	0	1	0	0	1
Roanoke	0	0		0		0	0	0	4	0	0	
West Virginia:												
Charleston	0	0		0		0	0	0	0	0	0	
Wheeling	0	0		0		0	1	0	1	0	0	2
North Carolina:												
Raleigh	0	0		0	5	0	3	0	1	0	0	1
Wilmington	1	0		0	3	0	0	0	0	0	0	
Winston-Salem	0	0		0	51	0	3	0	0	0	0	5
South Carolina:												
Charleston	3	0	20	0	2	1	1	0	1	0	0	0
Georgia:												
Atlanta	0	0	5	0	30	0	1	0	7	0	0	2
Brunswick	0	0		0	4	0	0	0	0	0	0	
Savannah	1	0	4	0	51	0	0	0	1	0	0	
Florida:												
Tampa	2	0		0		1	2	0	4	0	0	
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	6	0		1		2	16	1	6	0	0	13
Nashville	0	0		0		0	3	0	2	0	0	
Alabama:												
Birmingham	0	0	1	0	7	0	7	0	1	0	0	1
Mobile	2	0	1	0		0	4	0	4	0	0	
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0		0		0	0	0	0	0	0	
Louisiana:												
New Orleans	2	0	2	0	4	1	14	0	3	0	0	5
Shreveport	0	0		0		0	6	1	1	0	0	
Texas:												
Dallas	2	0		0		0	4	0	2	0	0	
Galveston	0	0		0		0	1	0	1	0	0	
Houston	0	0		0		0	5	3	6	0	1	
San Antonio	1	0		0	2	0	8	0	3	0	0	
MOUNTAIN												
Montana:												
Billings	0	0		0		0	1	0	0	0	0	
Great Falls	0	0		0	95	0	0	0	0	0	0	
Helena	0	0		0	10	0	1	0	0	0	0	
Missoula	0	0		0		0	0	0	0	0	0	1
Colorado:												
Denver	6	0	6	0	2	0	8	1	25	0	0	7
Pueblo	0	0		0		0	1	0	0	0	0	
Utah:												
Salt Lake City	0	0		0	2	0	8	0	5	0	0	[illegible]

City reports for week ended Jan. 11, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle	0	0		0	8	0	5	0	4	0	0	3
Spokane	1	0		0	15	0	4	1	8	0	0	
Tacoma	0	0		0	1	0	0	0	2	0	0	
California:												
Los Angeles	8	0	1	0	6	3	8	6	22	0	0	9
Sacramento	0	0		0	2	0	0	0	0	0	0	1
San Francisco	8	0	3	0	5	3	12	1	11	0	0	1
Total	102	2	89	17	1,111	33	453	18	588	0	4	759
Corresponding week, 1946	80		697	103	2,049		709		806	0	13	643
Average 1942-46	74		1,116	[2] 138	[3] 1,874		[2] 680		1,109	6	10	741

[2] 3-year average, 1944-46.
[3] 5-year median, 1942-46.

Dysentery, amebic.—Cases: Boston 1; Chicago 3; Memphis 1.
Dysentery, bacillary.—Cases: Chicago 2; Detroit 5.
Dysentery, unspecified.—Cases: Worcester 1; Cincinnati 1; Baltimore 1; San Antonio 5.
Leprosy.—Cases: Los Angeles 1.
Tularemia.—Cases: Washington, D. C., 1; Richmond 1.
Typhus fever, endemic.—Cases: Mobile 1; New Orleans 3; Dallas 1; Los Angeles 1.

Rates (annual basis) per 100,000 population, by geographic groups, for the 85 cities in the preceding table (estimated population, 1943, 34,143,800

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England	26.3	0.0	2.6	0.0	349	10.5	70.9	2.6	160	0.0	2.6	265
Middle Atlantic	13.4	0.0	12.0	8.7	164	2.3	71.3	0.5	71	0.0	0.9	96
East North Central	4.4	1.2	5.6	2.5	150	4.4	52.8	0.0	113	0.0	0.0	192
West North Central	14.1	0.0	8.0	2.0	22	6.0	88.5	4.0	70	0.0	0.0	38
South Atlantic	29.4	0.0	57.2	4.9	353	8.2	52.3	0.0	93	0.0	0.0	182
East South Central	47.2	0.0	11.8	5.9	41	11.8	177.1	5.9	77	0.0	0.0	83
West South Central	14.3	0.0	5.7	0.0	17	2.9	109.0	11.5	46	0.0	2.9	14
Mountain	49.6	0.0	49.6	0.0	900	0.0	115.6	8.3	248	0.0	0.0	66
Pacific	19.0	0.0	6.3	0.0	51	9.5	45.9	12.7	66	0.0	0.0	22
Total	15.6	0.3	13.6	2.6	170	5.0	69.4	2.8	90	0.0	0.6	116

TERRITORIES AND POSSESSIONS

Panama Canal Zone

Notifiable diseases—November 1946.—During the month of November 1946, certain notifiable diseases were reported in the Panama Canal Zone and terminal cities as follows:

Disease	Residence [1]									
	Panama City		Colon		Canal Zone		Outside the Zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox	2		2		7		2		13	
Diphtheria	8		7		1		6		22	
Dysentery:										
Amebic					1		4		5	
Bacillary	2		1		3				6	
Malaria [2]	6		2		18		28	1	54	1
Measles	24	1	17	1	32		10		83	2
Meningitis, meningococcus							1		1	
Mumps	2				6		1		9	
Pneumonia		11		6	21	6		5	[3] 21	28
Poliomyelitis					1				1	
Tuberculosis		20		10	2	2		4	[3] 2	36
Typhoid fever	1						1		2	
Whooping cough					2				[3] 2	

[1] If place of infection is known, cases are so listed instead of by residence.
[2] 7 recurrent cases.
[3] In the Canal Zone only.

Virgin Islands of the United States

Notifiable diseases—October–December 1946.—During the months of October, November, and December 1946, cases of certain notifiable diseases were reported in the Virgin Islands as follows:

Disease	October	November	December	Disease	October	November	December
Chickenpox			2	Mumps	1		
Dysentery, amebic			1	Paratyphoid fever			1
Filariasis	5		1	Syphilis	6	11	15
Gonorrhea	25	23	14	Tuberculosis		4	1
Hookworm disease	11	4	8	Yaws		1	
Lymphogranuloma inguinale	1						

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended December 28, 1946.—During the week ended December 28, 1946, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		4	1	85	253	18	31	41	81	514
Diphtheria		3		20	5	5				32
Dysentery, amebic					2					2
Encephalitis, infectious							1			1
German measles					3			4	8	15
Influenza		1			5	1				7
Measles		145	3	41	27	62	374	217	73	942
Meningitis, meningococcus							2			2
Mumps				6	204	13	70	24	117	434
Poliomyelitis		2		3	3					8
Scarlet fever		6	3	40	91	11		2	7	160
Tuberculosis (all forms)		14	6	72	42	19	5	9		167
Typhoid and paratyphoid fever				3					3	6
Undulant fever					2			1		3
Venereal diseases:										
Gonorrhea		7	5	47	59	17	18	19	83	255
Syphilis		8	2	30	39	3	4	1	51	138
Whooping cough			1	8	47	3	6	1	21	87

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-named diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday of each month.

Smallpox

China—Hong Kong.—For the week ended January 4, 1947, 73 cases of smallpox were reported in Hong Kong, China.

Yellow Fever

French Equatorial Africa—Ubangi Shari Department—Carnot.—Diagnosis has not been confirmed in the death from suspected yellow fever on December 21, 1946, in Carnot, Ubangi Shari Department, French Equatorial Africa, as published on page 148 of the PUBLIC HEALTH REPORTS for January 24, 1947.

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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PROGRESS TOWARD A WORLD HEALTH ORGANIZATION [1]

I. ESTABLISHMENT OF THE INTERIM COMMISSION

On July 22, 1946, the date on which representatives of 61 states signed the Constitution of the World Health Organization (WHO), there was also signed an Arrangement [2] establishing an Interim Commission composed of representatives of 18 states.[3] The Commission will carry on its activities until the first session of the World Health Assembly, which will meet not later than 6 months after the Constitution of the WHO has been formally accepted by 26 members of the United Nations. Thus far, China, the United Kingdom, Canada, Iran, and New Zealand have accepted. It is hoped that the United States will accept through action of Congress at an early date.

The Commission has held two sessions, the first in New York City, July 19–23, 1946, during the last days of the International Health Conference, and the second at Geneva, Switzerland, November 4–13, 1946.

II. FIRST SESSION OF INTERIM COMMISSION, NEW YORK, JULY 19–23, 1946

Pending definitive appointment of representatives by the governments concerned, the representatives at the first session were the heads of the appropriate delegations to the International Health Conference or persons appointed by them. The session was concerned largely with organizational matters.

[1] From the Office of International Health Relations, United States Public Health Service. Prepared by Dr. Morton Kramer of the Office of International Health Relations, United States Public Health Service, from official documents issued at the first and second sessions of the Interim Commission of the World Health Organization and from the report of the second session of the Interim Commission submitted by the United States representative to the Secretary of State.

[2] UN Document E/155.

[3] Australia, Brazil, Canada, China, Egypt, France, India, Liberia, Mexico, Netherlands, Norway, Peru, Ukrainian S. S. R., United Kingdom, United States of America, Union of Soviet Socialist Republics, Venezuela, and Yugoslavia.

A. Election of officers

The permanent officers of the Interim Commission are a chairman and three vice chairmen. Dr. F. G. Krotkov (U. S. S. R.), who declined to serve on a permanent basis, was elected temporary chairman and was succeeded at the termination of the session by Dr. Andrija Stampar (Yugoslavia) as permanent chairman. The three vice chairmen selected were Dr. O. S. Mondragon (Mexico), Dr. A. T. Shousha Pasha (Egypt), and Dr. Szeming Sze (China). Dr. G. Brock Chisholm (Canada) was appointed Executive Secretary.

B. Appointment of committees

Internal committees on administration and finance, epidemiology and quarantine, and relations were set up with membership as follows:

1. *Committee on Administration and Finance:*

Canada	Mexico	United Kingdom
China	Netherlands	United States
France	Ukrainian S. S. R.	Yugoslavia

2. *Committee on Epidemiology and Quarantine:*

Brazil	India	United Kingdom
China	Liberia	United States
Egypt	Peru	Yugoslavia
France	U. S. S. R.	

3. *Committee on Relations:*

Australia	Mexico	U. S. S. R.
Brazil	Netherlands	United States
Egypt	Norway	Venezuela

C. Administration and finance

The Committee on Administration and Finance was the only committee to meet during the first session. A budget of $300,000 for the remainder of 1946 and of $1,000,000 for 1947 was approved. The Committee also approved the future engagement of certain officials employed in UNRRA's Health Division, the League of Nations Health Organization, and the Office International d'Hygiène Publique.

In addition, the Committee voted that the Executive Secretary should be paid an annual tax-free salary of $13,500 together with a hospitality allowance of $5,000 and any other allowance to which he might be entitled in conformity with the practice of the United Nations for officials of the rank of Assistant Secretary General.

III. SECOND SESSION OF INTERIM COMMISSION, GENEVA, NOVEMBER, 4–13, 1946

The second session of the Interim Commission met in the Palais des Nations, Geneva, Switzerland, November 4–13, 1946, under the

chairmanship of Dr. Andrija Stampar (Yugoslavia). The session was attended by representatives of each of the eighteen member states, except Peru and the Ukraine, and by observers from the United Nations, UNRRA, the Office International d'Hygiène Publique, and the Pan American Sanitary Bureau.

The United States representative, Dr. Thomas Parran, was accompanied by Dr. H. van Zile Hyde, alternate; Dr. James A. Doull and Mr. H. B. Calderwood, advisers; and Miss Margaret Roberts, secretary. The complete list of representatives and observers is given in Appendix A.

A summary of the matters considered and actions taken follows.

A. Headquarters of the Interim Commission

The site of headquarters of the Interim Commission was not fixed by the International Health Conference nor by the Arrangement establishing the Commission, it having been the general understanding that the headquarters would be in New York City. The Executive Secretary, who established headquarters in New York City in July, presented a plea that the headquarters be moved to Geneva. In support of this, he cited the difficulties which the Secretariat had had in finding proper quarters in New York. He stated that the epidemiological information functions which the Commission was in the process of taking over from the Office International d'Hygiène Publique, UNRRA, and the League of Nations, and the more general health functions being taken over from UNRRA, could best be administered from a European base and that he had been assured by the United Nations that it would make adequate space available in the Palais des Nations. The United Nations observer stated, however, that he had received a telegram stating that the Secretary General of the United Nations could not assure the Interim Commission space in the Geneva Building, in view of current discussions in the General Assembly.

The Government of France, desirous of having the Interim Commission and later the WHO establish headquarters in Paris, invited the Commission, just preceding the opening of the second session, to inspect the Majestic Hotel (UNESCO House), the headquarters of UNESCO, and the estate of Baron de Rothschild, both of which are in Paris. The Executive Secretary of the Preparatory Commission of UNESCO offered the Interim Commission office space and secretariat service at UNESCO House, in the event the Commission should decide to establish headquarters in Paris.

After much discussion the following resolution was adopted by the Commission:

The Interim Commission:

(1) Takes note of the establishment of a headquarters office in New York capable of assuring indispensable liaison with the United Nations and the fulfillment of other functions of the Interim Commission;

(2) Authorizes its Executive Secretary to set up an office in Geneva in order to facilitate the activities of the Interim Commission;

(3) Authorizes its Executive Secretary, in agreement with the Chairman of the Interim Commission, to set up offices in other places if necessary.

The headquarters office will be in the Empire State Building, 350 Fifth Avenue, New York and the Geneva Office in the Palais des Nations.

B. Headquarters of the World Health Organization

According to the Constitution of the WHO, the location of its headquarters is to be determined by the World Health Assembly after consultation with the United Nations. Under the Arrangement of July 22, one of the functions of the Interim Commission is to make studies regarding location of the headquarters of the Organization.

A committee of five, consisting of the representatives of Canada, Egypt, India, Mexico, and Norway, was established to study the question of location of headquarters of WHO. In making such studies the Committee was instructed to "pay special attention to the privileges which would be granted by the host state, the internationalization of the seat, accessibility from and to the world at large, unrestricted and uninterrupted contact between the WHO and all countries of the world, climatic conditions, general use by the local population of either the working languages of the United Nations, adequate facilities for the immediate establishment of the necessary offices, printing facilities, etc., and the principle of centralization."

The Committee met on November 11 and decided that the Executive Secretary should get in touch with the various governments informing them of the likely requirements of the WHO in respect to accommodations and other facilities. The replies, as well as other available data, are to be circulated to members of the Committee for study. The Committee will meet one day before the beginning of the next session of the Commission to prepare a progress report. Discussion with the United Nations will be postponed until the data prepared by the Secretariat has been carefully studied.

C. Transfer to the Interim Commission of the health functions of other international agencies

1. The League of Nations Health Organization

The Executive Secretary reported that on October 16, 1946 the staff of the League of Nations Health Organization concerned with epidemiological intelligence and international standardization of biological products had been transferred from the United Nations to the Interim Commission. As early as February 12, 1946, the United Nations First Assembly decided to transfer to United Nations the health functions of the League of Nations. This decision was endorsed by the last assembly of the League of Nations in April 1946. The principle was recommended by the Technical Preparatory Committee in Paris in April and by the Economic and Social Council in June.

The International Health Conference, in the Arrangement signed on July 22, entrusted the Interim Commission with the task of taking all necessary measures to effect the transfer from the United Nations to the Interim Commission of the functions, activities, and assets of the League of Nations Health Organization which had been taken over by the United Nations (Article 2(d)).

The Conference had taken for granted that the transfer of these functions to the United Nations had been effected. Such, in fact, was not the case, and the work of the Health Section continued to be carried out under the authority of the Secretary General of the League until August 31, 1946, when the Secretariat was transferred to the United Nations. After the Economic and Social Council adopted a resolution on September 17, 1946, which, *inter alia,* emphasized the desirability of early transfer of the League of Nations' health functions from the UN to the Commission, the Secretary General of the UN and Executive Secretary of the Commission arranged for the transfer as from October 16, 1946. As a result of this action, the Assistant Secretary General of the United Nations in charge of the Department of Social Affairs reduced the Health Division of his Department to a Health Liaison Section to avoid duplication with the Commission.

2. Transfer of certain functions of UNRRA

As of December 1, 1946, the Commission took over the duties and functions entrusted to UNRRA by the International Sanitary Conventions of 1944 and the protocols prolonging them. This was one of the functions specifically assigned to the Interim Commission under Article 2(f) of the Arrangement establishing the Commission. This transfer was accomplished by an exchange of letters between the

Director General of UNRRA and the Executive Secretary of the Commission.

The Commission also approved a draft agreement with UNRRA under which UNRRA will turn over $1,500,000 to the Commission for the continuation of the following functions in countries receiving aid from UNRRA:

(a) Program of fellowships and other educational activities to provide training in the field of public health and medicine for suitably qualified personnel.

(b) Program to assist Ethiopia in the development of indigenous medical and nursing services.

(c) Program in tuberculosis, providing a staff of tuberculosis specialists available for advice and assistance in the control of tuberculosis.

(d) Program on malaria control.

(e) Program of general advice and assistance in public health and medicine, providing missions of experts and placing special emphasis on the needs of China.

The extent to which these programs are to be carried forward will be established by the Commission in consultation with the governments concerned. The Commission will undertake these activities on January 1, 1947, in Europe and on April 1, 1947, in the Far East.

In a telegram received from Mr. La Guardia, Director General of UNRRA, which informed the Commission of UNRRA's approval of the transfer of the above functions and funds, there was expressed the hope that "as part of the continuance of UNRRA functions and responsibility and, in connection with technical advice to receiving governments, it can be arranged that the Interim Commission will cooperate in carrying out observations of distribution of health supplies shipped by UNRRA which arrive after take-over date along lines of present UNRRA observation."

The Commission adopted the position that "it should cooperate as far as possible in affording technical *advice to governments upon their request* in the distribution of medical supplies but regrets that it finds itself unable to cooperate in carrying out observation of distribution of UNRRA supplies along the lines of present UNRRA observation."

In view of the necessarily drastic reduction in the scope of UNRRA activities imposed by the relatively small fund made available, the Commission recognized the necessity for a complete reevaluation of UNRRA programs in consultation with the several governments concerned. Pending the results of a survey, the Commission authorized the Executive Secretary to utilize, as necessary, $500,000 of the $1,500,000 in retaining UNRRA personnel until such time as a definite budget for the total amount might be constructed. A subcommittee of the Committee on Administration and Finance composed of the representatives of Canada, China, the Ukraine, the United Kingdom, the United States, and Yugoslavia was appointed to consider and approve, in January 1947, a budget for the total program

under the $1,500,000 fund, on the basis of studies and recommendations of the Executive Secretary.

3. Transfer of functions of the Office International d'Hygiène Publique

Dr. M. T. Morgan, President of the Permanent Committee of the Office International d'Hygiène Publique reported that the Permanent Committee had met in Paris on October 23, to determine how to carry out the terms of the Arrangement establishing the Commission and the Protocol relative to the dissolution of the Office International.

The Permanent Committee adopted on October 31, 1946 a resolution which authorized the President acting in association with the Committee on Transfer and Finance or with any two of its members acting on behalf of that Committee:

(a) To make temporary arrangements with the Interim Commission of the World Health Organization whereby that Commission acting as temporary agent of the Office shall receive notifications of the occurrence of outbreaks of disease and of epidemics as required by the Sanitary Conventions, shall transmit such information to governments which are parties to the Rome Agreement and to such Sanitary Conventions and shall prepare and issue the publications of the Office;

(b) To take the steps necessary to effect the transfer to the World Health Organization or its Interim Commission of the duties and functions which are assigned to the Office as soon as the Protocol of July 22, 1946, has entered into force;

(c) To take any action and make any arrangements which may appear necessary in anticipation of the transfer of the assets and liabilities of the Office to the World Health Organization or its Interim Commission, and in anticipation of the dissolution of the Office, in accordance with the terms of the above mentioned Protocol and of the Arrangement of July 22, 1946.

The Interim Commission set up a subcommittee consisting of the representatives of Australia, Mexico, and the Netherlands to act in cooperation with the Committee on Transfer and Finance of the Permanent Committee and authorized it to take any action considered appropriate to effect the transfer of functions to the Interim Commission, thus implementing Paragraph 2(e) of the Arrangement of July 22, 1946, and the Resolution adopted by the Permanent Committee of the Office.

Subsequently, it was arranged for the Commission to assume the epidemiological intelligence service of the Office from January 1, 1947. Negotiations for the publication of the Monthly Bulletin of the Office by the Interim Commission are still in progress.

D. State of negotiations with the Pan American Sanitary Organization

In application of Article 54 of the Constitution of the WHO which provides for the integration of the Pan American Sanitary Organiza-

tion with the WHO and of paragraph 2(g) of the Arrangement of July 22, which gives to the Commission the task of negotiating an agreement with the Pan American Sanitary Organization for presentation to the World Health Assembly, a special subcommittee of the Committee on Relations was appointed, consisting of the representatives of Brazil, Mexico, the United States, and Venezuela.

The Subcommittee presented the following report on its activities:

At the request of the representatives of Venezuela and Brazil, Dr. Parran (U. S. A.), on behalf of the Subcommittee, addressed a letter to Dr. Hugh S. Cumming, as Director of the PASB on September 27. This letter requested that the Directing Council of the PASB, scheduled to meet in Havana, Cuba, on October 1, be asked by the Director to appoint a committee to discuss with the subcommittee, in a preliminary manner, the terms under which the Organization might be integrated with the WHO as contemplated by Article 54 of its Constitution. The Director of the PASB, on October 10, directed a letter from Havana to Dr. Parran attaching a document approved by the Directing Council and designated as "the Declaration of Havana." This declaration was also transmitted by Dr. Cumming to the Executive Secretary of the Interim Commission and is reproduced in Document WHO.IC/W.19. It is being studied by the Subcommittee. The Subcommittee directs the attention of the Interim Commission to the fact that only one-third of the American republics are represented on the Directing Council of the PASB.

The Director of the PASB in reply to a second letter from Dr. Parran, asking whether the Directing Council of the PASB had appointed a negotiating committee, stated that the Directing Council "apparently thought that they were not authorized to do so. * * *"

The subcommittee expressed its unanimous position in support of the earliest possible acceptance of the Constitution of the WHO by all states, *without reservation.*

The subcommittee looks forward to the opportunity of entering into discussions with a negotiating committee which it hopes will be appointed by the Twelfth Pan American Sanitary Conference (Caracas, Venezuela, January 12, 1947) with a view to developing a draft agreement acceptable to the negotiating committee of the two organizations, for the presentation to the Interim Commission for consideration at its third session.

It is recommended that the present subcommittee be continued; and in the event that an invitation is received by the Interim Commission from the Government of Venezuela to be represented at the Caracas Conference, the subcommittee be authorized to represent the Interim Commission and to initiate negotiations on its behalf with any appropriate committee designated or appointed by the Twelfth Pan American Sanitary Conference.

Two telegrams were received from the Ministry of Public Health of Venezuela, one inviting the Chairman of the Interim Commission or his representative and the other inviting Drs. Chisholm and Biraud to be present as observers at the Twelfth Pan American Sanitary Conference to be held at Caracas January 12–24, 1947.

The Commission decided that the Subcommittee on Negotiations with PASB should represent it at the Caracas Conference.

E. Technical committees established

The Interim Commission determined that it should have two types of committees: (1) *internal committees*, composed of representatives on the Interim Commission, and (2) *technical committees*, composed of experts appointed jointly by the Chairman of the Commission and the Executive Secretary.

The Commission adopted a procedure for the appointment of members of technical committees and subcommittees. The procedure requires that, in the selection of experts, the paramount consideration shall be their technical proficiency and experience, but consideration shall also be given to their being drawn from as wide a geographical basis as possible. The Executive Secretary is to invite suggestions for names of experts from the members of the Commission and from the national health administrations.

The following technical committees were established:

1. Committee on Quarantine with Subcommittee on Yellow Fever

A Committee on Quarantine was established to consist of experts from the following countries: Brazil, China, France, the Netherlands, India, Egypt, the United Kingdom, the U. S. S. R., and the U. S. A. This Committee is to deal with problems arising out of the application of the existing Sanitary Conventions. To carry out the special functions in regard to yellow fever assigned to UNRRA by Sanitary Conventions of 1944, the Interim Commission authorized the appointment of a Subcommittee on Yellow Fever not to exceed seven persons. The Quarantine Committee is to meet twice a year, preferably at times when the Interim Commission is in session.

2. Committee on the Revision of the International Sanitary Conventions with a Subcommittee on Pilgrimage

It was agreed that the existing Sanitary Conventions called for revision and that a committee for the work would have to be set up, preferably at the next session of the Interim Commission. Consideration was given to the special and complex problems related to the sections of the Sanitary Conventions applying to the Moslem pilgrimage referred to the Commission by the Permanent Committee of the Office International.

Pending a meeting of the Revision Committee, it was decided to appoint a subcommittee of six members to be drawn from Egypt, Saudi Arabia, France, the United Kingdom, India, and the Netherlands to consider the revision of the pilgrimage clauses of the Sanitary Conventions.

3. Committee on Malaria

The appointment of an expert Committee on Malaria of five members to study and advise on this problem was authorized.

4. Committee on Narcotic Drugs

The Commission adopted a resolution of the representative from China, "that an expert Committee on Narcotic Drugs composed of five persons technically qualified in the pharmacological and clinical aspects of drug addiction be appointed to advise the Interim Commission on any technical questions concerning this subject which may be referred to it." This Committee will be available to the Narcotics Commission of the Economic and Social Council to advise it on technical matters within the competence of WHO.

5. Committee on Biological Standardization

The Commission adopted a resolution introduced by the Secretariat for the appointment of a small body of experts, whose number is not to exceed eight, to form a nuclear Committee on Biological Standardization. These experts will define the subjects which appear to be the most urgent for study and will draw up a plan of work for consideration of the Commission, covering the setting up of international standards and units in the fields selected.

6. Committee on Revision of International List of Causes of Death and Establishment of International List of Causes of Morbidity

The Commission authorized the appointment of a committee, not to exceed nine persons, on revision of the International List of Causes of Death to carry on the preparatory work for the sixth decennial revision of the List, including the making of recommendations to the Commission concerning action which it might appropriately take to effect the revision. A further resolution authorized this Committee to review existing machinery and continue preparatory work as is necessary to effect the establishment of international lists of causes of morbidity.

The Committee structure of the Commission at the conclusion of its second session is presented in chart A.

F. Report of the Epidemiology and Quarantine Committee

In addition to the establishment of technical committees on quarantine, yellow fever, and pilgrimage, the following recommendations of the Committee on Epidemiology and Quarantine were approved by the Commission.

(1) The Executive Secretary was instructed:

(*a*) To collect information regarding the most modern ideas of quarantine control, especially changes in legal form in the character of quarantine agreements;

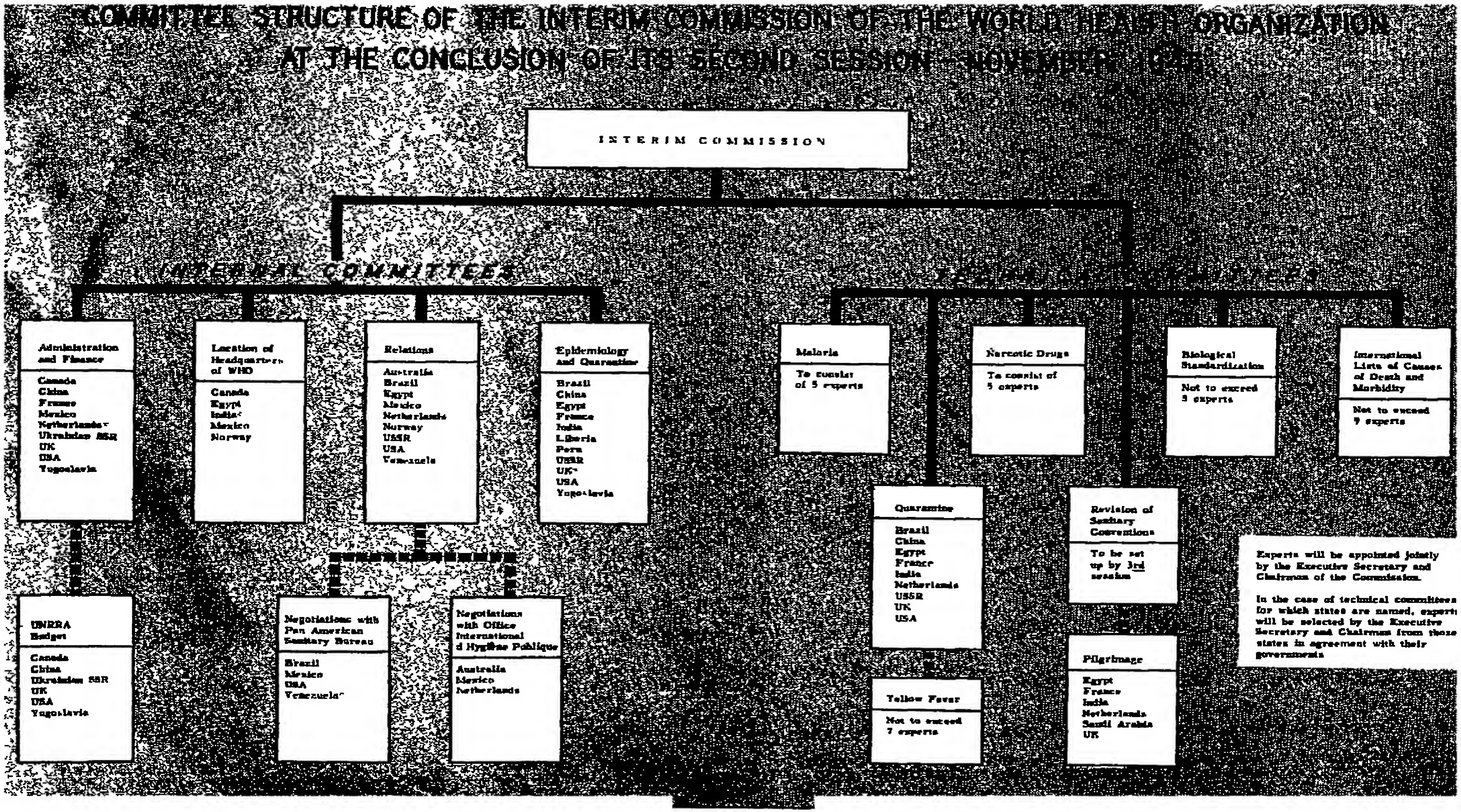

COMMITTEE STRUCTURE OF THE INTERIM COMMISSION OF THE WORLD HEALTH ORGANIZATION
AT THE CONCLUSION OF ITS SECOND SESSION NOVEMBER
INTERIM COMMISSION
INTERNAL COMMITTEES
Administration and Finance
Canada
China
France
Mexico
Netherlands
Ukrainian SSR
UK
USA
Yugoslavia
Location of Headquarters of WHO
Canada
Egypt
India
Mexico
Norway
Relations
Australia
Brazil
Egypt
Mexico
Netherlands
Norway
USSR
USA
Venezuela
Epidemiology and Quarantine
Brazil
China
Egypt
France
India
Liberia
Peru
USSR
UK
USA
Yugoslavia
UNRRA Budget
Canada
China
Ukrainian SSR
UK
USA
Yugoslavia
Negotiations with Pan American Sanitary Bureau
Brazil
Mexico
USA
Venezuela
Negotiations with Office International d'Hygiène Publique
Australia
Mexico
Netherlands
Malaria
To consist of 5 experts
Narcotic Drugs
To consist of 5 experts
Biological Standardization
Not to exceed 5 experts
International Lists of Causes of Death and Morbidity
Not to exceed 9 experts
Quarantine
Brazil
China
Egypt
France
India
Netherlands
USSR
UK
USA
Revision of Sanitary Conventions
To be set up by 3rd session
Yellow Fever
Not to exceed 7 experts
Pilgrimage
Egypt
France
India
Netherlands
Saudi Arabia
UK
Experts will be appointed jointly by the Executive Secretary and Chairman of the Commission.
In the case of technical committees for which states are named, experts will be selected by the Executive Secretary and Chairman from those states in agreement with their governments

CHART A.

(*b*) To prepare a note with regard to the delimitation of the regional areas for epidemiological intelligence;

(*c*) To ask signatory governments for the following information: (i) a statement concerning the practical use to which it puts the epidemiological information it receives from international health agencies by wireless, cable, and mail, weekly, monthly and annually; (ii) a statement concerning the form in which such information would be most useful to it; and (iii) recommendations concerning the manner in which a unified epidemiological information service might be of greatest practical assistance to it in protecting itself against the incursion of disease;

(*d*) To prepare documents so that the Commission might at its third session embark on "studies regarding the definition of geographical areas with a view to the eventual establishment of regional organizations as contemplated in Chapter XI of the Constitution, due consideration being given to the views of the governments concerned."

(2) The Commission took note of the fact the Office International d'Hygiène Publique would refer to it the following technical questions:

(*a*) The continuation of studies of postvaccinal encephalitis, and

(*b*) Studies on the value of the immunity reaction in smallpox vaccination.

(3) Consideration of a proposal made by the representative of Liberia, that the expert committee on malaria study other tropical diseases as well and in the end recommend to the First World Health Assembly the establishment of a Tropical Disease Institute, was postponed.

(4) Proposals for a technical committee on the study of public health services in various countries and for investigations of available resources for training medical and other staff essential for public health services were considered. It was agreed to recommend the inclusion of this item on the agenda for the First World Health Assembly and to request the Secretariat to prepare an historical outline of the work done in this field and to incorporate proposals for its continuation and development.

(5) It was agreed that the item "International Programs in Combating Venereal Disease" should be placed on the agenda for the first meeting of the Health Assembly and that in the meantime the chairman of the Commission should appoint an expert in venereal disease to prepare a note on questions relating to venereal disease calling for urgent consideration.

G. Administration and finance

The Commission received a note from the Executive Secretary on the financial situation which showed that the estimated expenditures for 1946 would be $220,000 or $80,000 less than the $300,000 available. The Executive Secretary explained that the residual funds would be required in 1947 to carry on activities deferred from 1946. He was authorized to request the United Nations to make the full $300,000 available for expenditure in 1946 or 1947, as the case might be.

It was agreed that all administrative expenses in connection with the duties and functions taken over from UNRRA, except those related to epidemiological information, should be met from funds transferred from UNRRA.

There was no detailed review of the 1947 budget which, at the time, was before the General Assembly of the United Nations for approval and allocation of funds. It was recognized, however, that the budget was not applicable in all details since the committee structure contemplated by the budget had been modified by the Commission and the timing of the taking over of functions of other agencies had been somewhat different from that contemplated. The authority given to the Executive Secretary to transfer funds from one item to another within the broad chapters of the budget was considered to provide sufficient elasticity to meet necessary expenses. The Commission will review and approve a modified budget at its third session.

Regulations were adopted for the payment of travel expenses and subsistence of the representatives from each of the 18 member nations, of members of technical committees, subcommittees, and consultants.

The Commission instructed the Executive Secretary, in appointing technical and administrative staff members whose salary is at the rate of $8,000 per annum or higher, to secure approval of the chairman of the Interim Commission.

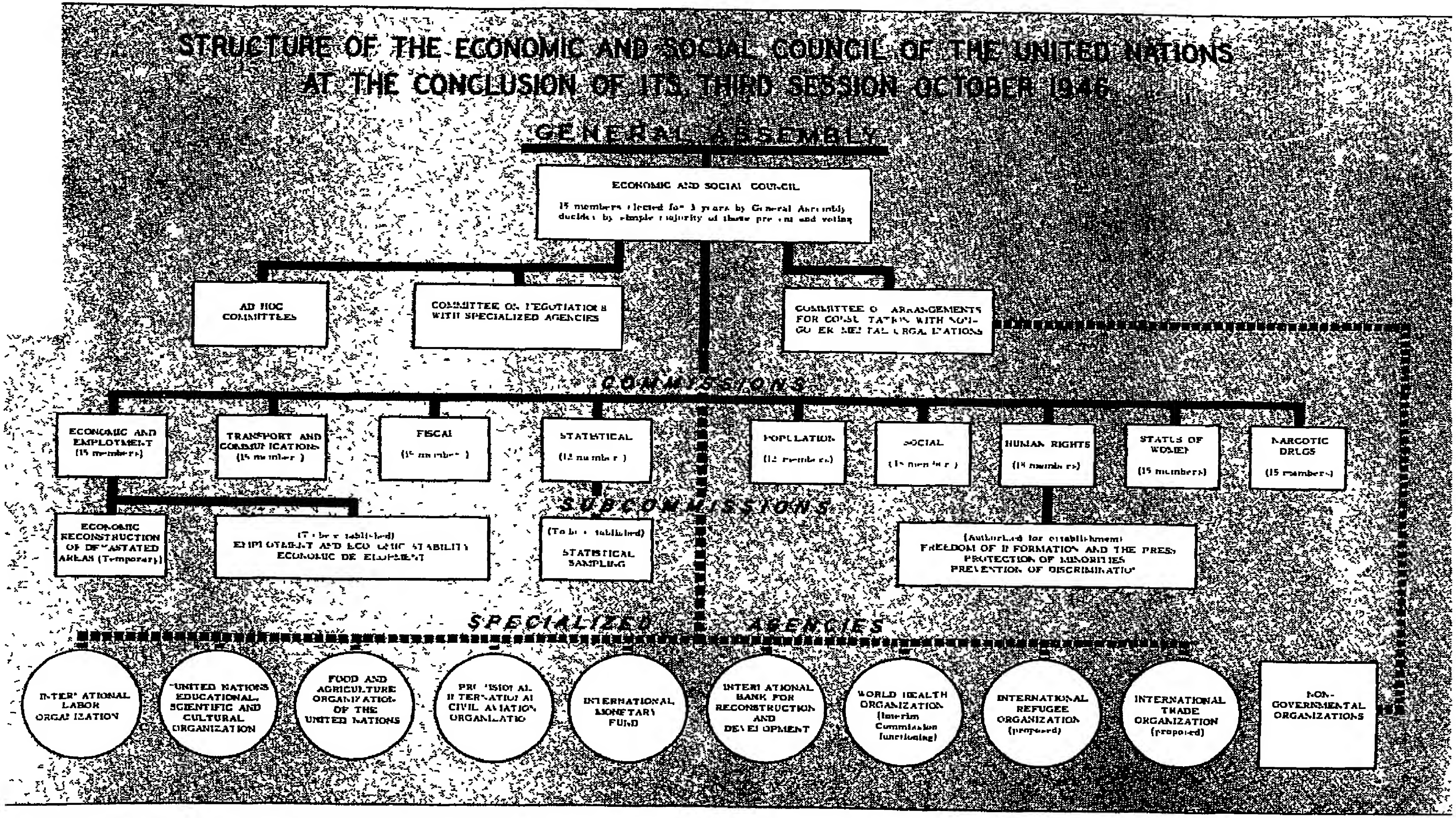
In view of the complexity of the problem of the development of staff regulations and the attention being given to the matter by the United Nations, the Commission agreed that the regulations of the United Nations, insofar as they are applicable, should govern the conditions of employment of the staff of the Interim Commission. The Executive Secretary was instructed that, in applying these regulations, provisions should be made to permit the Director General of the World Health Organization to review within a reasonably short time after taking office the continued employment by the Organization of such staff.

H. Relationship with the United Nations

1. General remarks on the Economic and Social Council

The Economic and Social Council (ECOSOC) is charged with the social and economic functions of the United Nations. Because these responsibilities affect many aspects of international cooperation, the Council has to work through a number of commissions and committees. The structure of the Council at the conclusion of its third session in October 1946 is shown in chart B.

It should be noted that several of the commissions of the Council, such as the Statistical, Population, Social, and Narcotic Drugs Commissions, are concerned with fields which are of interest to the WHO.



...egotiation to bring these agencies into relationship with the United Nations have already been undertaken and draft agreements have been forwarded by the Council to the General Assembly for its approval.

CHART B.

Facsimile of chart issued by United Nations Department of Public Information.

The terms of reference of these commissions and their membership composition are given in Appendix B.

ECOSOC has the responsibility of bringing into relationship with the United Nations the various specialized agencies, such as the World Health Organization, the Food and Agricultural Organization, and others. It is the organ of the United Nations which coordinates the work of these agencies. The Council's Committee on Negotiations with Specialized Agencies negotiates agreements by which these agencies are brought into relationship with the United Nations.

2. UN-WHO draft agreement

The Commission considered a proposed draft agreement between the UN and the WHO, based on agreements of the UN with other specialized agencies, which contains 21 articles for establishing the relationships between the two organizations. Certain modifications were recommended and the Executive Secretary was authorized to continue discussions at the Secretariat level with the United Nations. It was considered premature to establish a committee at this point to negotiate with a committee of the United Nations.

I. Relationships with other specialized agencies of the United Nations

1. Principles of relationship

The Executive Secretary presented to the Commission a note concerning the relationship between the WHO and other specialized agencies. This note included a statement of basic principles and a review of relationships to date with other agencies. The Commission approved the basic principles incorporated in the note and authorized the Executive Secretary to continue negotiations, at the Secretariat level, with other specialized agencies, with the objective of developing draft agreements for consideration by the Commission and eventual presentation to the World Health Assembly. The basic principles approved by the Commission are briefly:

(1) No agency should enter the field of another agency without previous consultation and agreement with that agency;

(2) Collaboration between two agencies should aim at bringing together to deal with common problems experts of related but different and complementary fields rather than experts in the same field and with the same point of view nominated by the two different agencies;

(3) Joint committees are the most effective means of getting such experts to work together;

(4) Representation on such committees should be apportioned on the basis of the relative importance of the particular field to the various agencies participating in such joint committees;

(5) Secretariat duties in connection with joint committees should be apportioned between the participating agencies upon the basis of the relative importance of the subject to each agency;

(6) In the case of a subject which is the exclusive responsibility of one agency, but in which another agency has an interest, the former agency should supply the latter, upon request, with information concerning the subject;

(7) A joint committee should be permitted to establish subcommittees composed of experts derived from the participating agencies on the basis of the relative interest of each agency in the specific problem being handled by the subcommittee, even to the extent of a subcommittee being composed entirely of experts of a single agency;

(8) There should be a systematic exchange of all publications between specialized agencies;

(9) Each specialized agency should invite observers of all other specialized agencies to annual general conferences of assemblies;

(10) Specialized agencies should invite to their executive boards or technical committees observers from the other agencies when the agenda justifies this action;

(11) In certain instances permanent liaison officers should be appointed between specialized agencies with extensive common interests.

2. *Current status of relationships*

The Executive Secretary's note reported the following progress in relationships with the following specialized agencies:

a. *Food and Agriculture Organization (FAO)*

Upon invitation of the Director General of FAO, the Commission was represented at the second session of the FAO's annual conference, Copenhagen, September 2, 1946, by Dr. Karl Evang (Norway) and Dr. Biraud, Deputy Executive Secretary of the Interim Commission. The report of the Standing Committee on Nutrition and Food Management of the FAO included a chapter on relations of FAO with WHO. This report pointed out the need for coordination between the two agencies and distinguished between the respective interests in nutrition. It stressed the interest of WHO, as well as FAO, in the national nutrition committees to be formed and associated with the international nutrition committee. Dr. Evang and Dr. Biraud suggested that a joint committee on nutrition be formed by FAO and WHO, or, if such unification was not possible, that there should be the closest possible communication between the standing committees on nutrition of the two organizations, possibly by arranging that a number of individuals should be members of both committees.

The FAO standing committees on nutrition and on agriculture strongly recommended the formation of a joint standing committee with WHO on rural hygiene.

The FAO invited the Interim Commission to be represented at the

Preparatory Commission of the World Food Board, in Washington, October 28. Since the agenda of that meeting did not include any items bearing directly on health, the Executive Secretary of the Commission declined the invitation.

b. International Labor Organization (ILO)

At its twenty-ninth session, the governing body of the ILO "noted with satisfaction the provisions contained in the Constitution of the WHO that the Health Organization would act in cooperation with other specialized agencies in respect of a number of matters of direct interest with the ILO, notably the prevention of accidental injury, the improvement of nutrition, housing, sanitation, recreation, economic or working conditions and other aspects of environmental hygiene, promotion of maternal and child health welfare and the study of administrative and social techniques affecting the public health and medical care from the preventive and curative points of view, including hospital and social services. * * * The International Labor Conference has already, by the terms of the Declaration of Philadelphia, pledged the full cooperation of the ILO with such international bodies as may be interested, with a share of the responsibility for the promotion of health of all peoples."

The ILO invited the Interim Commission to be represented at the twenty-ninth annual session in Montreal on September 19. This invitation was declined on the grounds that the agenda did not contain any item of interest to the WHO, although it was expected that this probably would not be the case in the future.

The Executive Secretary of the Interim Commission on September 13 suggested to Mr. E. J. Phelan, Director General of ILO, that two joint committees be set up at the technical level; one on industrial hygiene and the other on provision for health care and medical services. The Executive Secretary suggested that the former might have equal representation or even predominant ILO representation, whereas the latter should include one or two ILO members. He also suggested that the joint committee on nutrition might include a representative of the ILO.

c. Provisional International Civil Aviation Organization (PICAO)

PICAO, in July 1946, through its Assistant Secretary General for Air Transport, had expressed a desire for general liaison with the Interim Commission. On August 5, Mr. Albert Roper, Secretary General of PICAO, expressed the wish of that organization to take part in discussions for the revision of the Sanitary Convention for Aerial Navigation, and suggested that a joint committee be formed within or under the Quarantine Committee of the Interim Commission.

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The Executive Secretary of the Interim Commission agreed to the principle of such representation.

The Secretary General of PICAO asked for representation of PICAO at the Interim Commission's second session on November 4, 1946, but was informed that, as the session represented only a preliminary state of the Commission's work, invitation of other specialized agencies would be premature.

d. United Nations Educational, Scientific, and Cultural Organization (UNESCO)

A draft agreement between WHO and UNESCO, based upon the UNESCO-UN Agreement was submitted unofficially to the Chairman of the Interim Commission by Mr. V. Darchambeau, Permanent Representative of UNESCO with the United Nations. The terms of this agreement were outlined in a note presented by the Executive Secretary to the Commission. Essentially, the draft provides that UNESCO shall have responsibility in matters related to the basic sciences and WHO will have similar responsibility for the medical and health sciences. The Commission did not at the second session give detailed consideration to this proposed agreement.

J. Relationships with nongovernmental organizations interested in health

The Executive Secretary noted that several international and national nongovernmental organizations interested in health have already expressed a desire to establish official relationships with the Commission and later with the WHO. He deemed it advisable for relationships to be established with a number of these organizations, especially those whose fields of action are definitely within the realm of the WHO and whose scientific standing and practical value have been definitely established. Among these are the International Union Against Tuberculosis, the International Union Against Cancer, the International Union Against Venereal Diseases, and the World Medical Association. There was a discussion of the principles that should govern the relationships between the Organization and these nongovernmental agencies, but, because of the complexity of the problem, the Commission referred the matter back to the Secretariat for further study.

K. Resolution concerning the establishment of research laboratories by the United Nations

The Commission, taking cognizance of a resolution adopted by the ECOSOC on October 3, 1946 (UN Doc. E/233) regarding the establishment of research laboratories, adopted a resolution requesting

that "in view of the responsibility and authority placed upon the WHO in respect of international research in the field of health and in view of the responsibility assigned by the intergovernmental Arrangement of July 22, 1946, to the Interim Commission for preparing for the First World Health Assembly, the ECOSOC limit its action in regard to international research in health prior to the first meeting of the World Health Assembly, to consultation with interested agencies, including the Interim Commission, and to the development of such recommendations as may be determined helpful to the World Health Assembly."

L. Third session of Interim Commission

It was decided that the third session of the Interim Commission will meet in Geneva on March 31, 1947. The Committees on Administration and Finance, Location of Headquarters of WHO, and Malaria will meet in Geneva immediately preceding the session.

APPENDIX A

LIST OF REPRESENTATIVES, SECOND SESSION, INTERIM COMMISSION, WORLD HEALTH ORGANIZATION, GENEVA, NOVEMBER 4–13, 1946

AUSTRALIA

Representative:
Dr. George Muir REDSHAW
Chief Medical Officer
Australia House
London

BRAZIL

Representative:
Dr. Geraldo H. de PAULA SOUZA
Directeur de la Faculté d'Hygiène et Santé publique
Université de São Pauló
Brésil

CANADA

Representative:
The Hon. Brooke CLAXTON
Minister of National Health and Welfare
Substitute:
Dr. Thomas C. ROUTLEY
General Secretary
Canadian Medical Association
Advisers:
Dr. H. A. ANSLEY
Assistant Director of Health Services
National Department of Health and Welfare, Ottawa
Mr. Jean CHAPDELAINE
Secretary
Canadian Embassy in Paris
Secretary:
Mrs. B. PARÉ-FULLER

CHINA

Representative:
Dr. Szeming SZE
Resident Representative in Washington of the National Health Administration in China

EGYPT

Representative:
H. E. Dr. Aly Tewfick SHOUSHA Pasha
Under Secretary of State
Ministry of Public Health
Cairo

FRANCE

Representative:
Dr. André CAVAILLON
Directeur Général de la Santé, Ministère de la Santé Publique
Substitutes:
Dr. Xavier LECLAINCHE
Directeur Régional de la Santé
Dr. Lucien BERNARD
Médecin Inspecteur de la Santé, Ministère de la Santé Publique
Dr. H. Y. SAUTTER
Médecin Inspecteur de la Santé, Ministère de la Santé Publique

INDIA

Representative:
Major C. MANI
Deputy Public Health Commissioner
New Delhi

LIBERIA

Representative:
Dr. Joseph N. TOGBA
Physician to Liberian Government, Department of State, Monrovia

MEXICO

Representative (absent):
Dr. Octavio S. MONDRAGON
Undersecretary, Ministry of Public Health and Social Welfare
Substitute:
Dr. Manuel MARTINEZ-BAEZ
Permanent Representative of Mexico to UNESCO

NETHERLANDS

Representative:
Dr. C. Van den BERG
Director General of Public Health, Ministry of Social Affairs
Dr. W. A. TIMMERMAN
Director of the National Institute of Public Health, Utrecht
Adviser:
Mr. C. J. GOUDSMIT
Ministry of Social Affairs
Secretary:
Miss H. C. HESSLING
Ministry of Social Affairs

NORWAY

Representative:
Dr. Karl EVANG
Surgeon-General of the Department of Public Health

PERU

Representative (Absent):
Dr. Carlos Enrique PAZ SOLDAN
Professor of Hygiene
Faculty of Medicine

UKRAINIAN S. S. R.

Representative (Absent):
Dr. Levko I. MEDVED
Deputy Minister of Public Health

UNITED KINGDOM

Representative:
Dr. Melville MACKENZIE
Principal Medical Officer
Ministry of Health
Substitutes:
Dr. W. H. KAUNTZE
Chief Medical Adviser
Colonial Office
Mr. L. M. FERRY
Principal, General Register Office
Advisers:
Dr. Percy STOCKS
Medical Statistician
Office of the Registrar General for England and Wales
Mr. C. H. K. EDMONDS
Assistant Secretary
Ministry of Health
Advisers—Continued
Mr. R. BRAIN
Principal
Ministry of Health
Mr. F. A. VALLAT
Foreign Office
Secretaries:
Miss EAST
Miss FARREN

UNITED STATES OF AMERICA

Representative:
Dr. Thomas PARRAN
Surgeon General
U. S. Public Health Service
Substitute:
Dr. H. van Zile HYDE
Senior Surgeon
U. S. Public Health Service
Advisers:
Dr. James A. DOULL
Chief of the Office of International Health Relations
U. S. Public Health Service
Mr. Howard B. CALDERWOOD
Consultant
U. S. Public Health Service
Secretary:
Miss M. ROBERTS

UNION OF SOVIET SOCIALIST REPUBLICS

Representative:
Dr. Fedor Grigorievitch KROTKOV
Deputy Minister of Public Health, Member of the Academy of Medical Sciences
Secretary-Interpreter:
Miss Ann MIKHALCHY

VENEZUELA

Representative (Absent):
Dr. Alfredo Arreza GUZMAN
Director of Public Health, Ministry of Health and Social Welfare
Substitutes:
Dr. Arnoldo GABALDON
Chief, Malaria Division, Ministry of Health and Social Welfare
Dr. Dario CURIEL
Chief, Division of Epidemiology and Vital Statistics, Ministry of Health
Adviser:
Dr. Santiago RUESTA Marca
Technical Assessor, Ministry of Health and Social Welfare

YUGOSLAVIA

Representative:
Dr. Andrija STAMPAR
Rector of the University of Zagreb
Substitute:
Dr. Dimitrije JUZBASIC
Professor of the Medical School of Skoplje

OBSERVERS

UNITED NATIONS

Mr. Gilbert E. YATES
Secretary Economic and Social Council

Dr. A. Jean LUCAS
Chief of the General Research Section
Department of Trusteeship

OFFICE INTERNATIONAL D'HYGIÈNE PUBLIQUE

Dr. M. T. MORGAN
President of the Permanent Committee of the O. I. H. P.

Dr. L. M. GAUD
Président de la Commission des Finances et du Transfert

PAN AMERICAN SANITARY BUREAU

Dr. Aristides A. MOLL
Secretary, Pan American Sanitary Bureau

UNITED NATIONS RELIEF AND REHABILITATION ADMINISTRATION

Dr. Neville M. GOODMAN
Director of Health Division
European Regional Office
London

APPENDIX B

TERMS OF REFERENCE AND MEMBERSHIP COMPOSITION OF THE STATISTICAL, POPULATION, SOCIAL, AND NARCOTIC DRUGS COMMISSIONS OF THE ECONOMIC AND SOCIAL COUNCIL

I. STATISTICAL COMMISSION

Terms of reference

At its first session,[1] the Economic and Social Council established a nuclear Statistical Commission, to report back to the Council on the functions and scope of work which the permanent Statistical Commission should undertake. As a result of this report, the Council at its second session [2] decided that the terms of reference of the Statistical Commission [3] should be as follows:

The Commission shall assist the Council:

(*a*) In promoting the development of national statistics and the improvement of their comparability;

(*b*) In the coordination of the statistical work of specialized agencies;

(*c*) In the development of the central statistical services of the secretariat;

(*d*) In advising the organs of the United Nations on general questions relating to the collection, interpretation, and dissemination of statistical information;

(*e*) In promoting the improvement of statistics and statistical methods generally.

Further, the Council decided that:

(*a*) The Statistical Commission should formulate recommendations concerning the methods by which the activities of quasi governmental and nongovernmental statistical organizations may be related to those of the United Nations in fostering international cooperation in the improvement of statistics;

(*b*) A central statistical unit should be organized within the Secretariat of the United Nations;

[1] First session held at Church House, London, January 23 to February 16, 1946.
[2] Second session held at Hunter College, New York, May 25 to June 21, 1946.
[3] U. N. Document E/133/Rev. 2, October 2, 1946.

(c) Arrangements should be made whereby the Secretariat of the United Nations would maintain, without interruption, the statistical activities of the League of Nations.

Membership

The Council decided at its second session that the Commission should consist of one representative from each of twelve members of the United Nations selected by the Council. At its third session,[4] the Council selected the following states to designate the initial members:

For two years	*For three years*	*For four years*
China	Canada	France
Netherlands	Mexico	Norway
Union of Soviet Socialist Republics	India	Turkey
United States of America	Ukrainian S. S. R.	United Kingdom

U. S. Member: The United States member of the Statistical Commission is Stuart A. Rice, Assistant Director in Charge of Statistical Standards, Bureau of the Budget.

Subcommission on Statistical Sampling

The Council authorized the Statistical Commission to establish a Subcommission on Statistical Sampling, to consist of not more than nine members.

World Statistical Congress

At the third session, the delegate for Lebanon pointed out that during the latter part of 1947 there will be a number of important international meetings relating to statistical matters in the United States. He made the proposal, which was approved by the Council, that the Secretary General, in consultation with the Statistical Commission, should explore "with those responsible for the organization of such meetings and with the appropriate specialized agencies, the practicability and desirability of coordinating the arrangements being made in such a manner as to constitute a World Statistical Congress in September 1947 under the aegis of the Economic and Social Council, and should make a report and recommendations on this matter to the Council at its next meeting."

II. POPULATION COMMISSION

Terms of reference

The Council decided at the third session to establish a Population Commission (replacing the former name of Demographic Commission) with the following terms of reference:[5]

[4] Third session held at Lake Success, Long Island, September 11 to October 3, 1946.

[5] U. N. Document E/190/Rev. 1.

The Population Commission shall arrange for studies and advise the Council on:

(a) population changes, the factors associated with such changes, and the policies designed to influence these factors;

(b) interrelationships of economic and social conditions and population trends;

(c) migratory movements of population and factors associated with such movements;

(d) any other population problems on which the principal or subsidiary organs of the United Nations or the specialized agencies may seek to advise.

The first task of the Population Commission is to draw up a specific program of work based on its terms of reference and taking into account any modifications in those terms of reference which the Commission may wish to recommend to the Council.

Membership

The Council decided at its second session that the Commission should consist of one representative from each of twelve members of the United Nations selected by the Council. At its third session, the Council selected the following states to designate the initial members:

For two years	*For three years*	*For four years*
China	Australia	Brazil
United Kingdom	Canada	Netherlands
United States of America	France	Peru
Union of Soviet Socialist Republics	Ukrainian S. S. R.	Yugoslavia

In order to maintain close liaison between the Population Commission and other bodies concerned with population problems, the Council decided that the Population Commission should invite representatives from the Economic and Employment Commission, Statistical Commission, Social Commission, and, until such time as the World Health Organization should become a specialized agency, from the Interim Commission of the World Health Organization, such representative to take part in the proceedings but not to be entitled to vote.

U. S. Member: The United States member of the Commission is Philip M. Hauser, Assistant to the Secretary, Department of Commerce.

III. SOCIAL COMMISSION

Terms of reference

The Council set up a nuclear Temporary Social Commission at its first session. In the light of the report[6] submitted by the Temporary

[6] U. N. Document E/41.

Commission to the Council at its second session, the Council decided that the terms of reference of the Permanent Commission should be:

(*a*) To advise the Council on social questions of a general character and in particular on all matters in the social field not covered by specialized intergovernmental agencies;

(*b*) To advise the Council on practical measures that may be needed in the social field;

(*c*) To advise the Council on measures needed for the coordination of activities in the social field;

(*d*) To advise the Council on such international agreements and conventions on any of these matters, as may be required, and on their execution;

(*e*) To report to the Council on the extent to which the recommendations of the United Nations in the field of social policy are being carried out.

The Council also referred the following matters to the Social Commission:

(a) The observations of the Temporary Social Commission concerning provisions needed in the social welfare field included in Section XI of its report, and its suggestions as to methods by which such work might be carried on.

(b) The observations and recommendations concerning the activities of the League of Nations in the social field included in Section XIV of the report of the Temporary Social Commission were referred to the Social Commission with the request that, in the light of conditions prevailing in the postwar world, it consider:

(i) The best way of carrying on the functions undertaken by the League, with reference to traffic in women and children and all measures designed to prevent such traffic;

(ii) How work in the child welfare field could be effectively carried out, in co-operation with those international organizations, which are concerned with particular aspects of these problems, and take steps to create a subcommission especially constituted for work in the child welfare field;

(iii) How effective machinery could be developed for studying on a wide international basis the means for the prevention of crime and the treatment of the offender, and that the Commission also undertake consultation with the International Penal and Penitentiary Commission, and recommend a scheme by which work on this whole subject could be fruitfully dealt with on a broad international basis in close association with other social problems.

(c) The observations of the Temporary Social Commission in Section XV of its report concerning social problems requiring immediate attention, expecially problems in countries directly affected by war or under enemy occupation to which first priority should be given and in countries which are underdeveloped, were referred to the Social Commission. The Commission was requested to give special attention to these problems and particularly to the urgent need for

finding some way of dealing with the important aspects of the work of the United Nations Relief and Rehabilitation Administration, mentioned in the report, after it is brought to a close. The Social Commission was also asked to consider the desirability of setting up international machinery in the fields of housing and town and country planning.

Membership

The Council decided at its second session that the Commission should consist of one representative from each of eighteen members of the United Nations selected by the Council. At its third session, the Council selected the following states to designate the initial members:

For two years	*For three years*	*For four years*
Czechoslovakia	Colombia	Canada
France	Netherlands	China
Greece	New Zealand	Denmark
Union of South Africa	Peru	Ecuador
Union of Soviet Socialist Republics	United Kingdom	Iraq
United States of America	Yugoslavia	Poland

U. S. Member: The United States member of the Commission is Arthur J. Altmyer, Commissioner for Social Security, Social Security Administration, Federal Security Agency.

IV. COMMISSION ON NARCOTIC DRUGS

Terms of reference

The Council decided at its first session to establish a Commission on Narcotic Drugs, with the following terms of reference:

The Commission shall:

(*a*) Assist the Council in exercising such powers of supervision over the application of international conventions and agreements dealing with narcotic drugs as may be assumed by or conferred on the Council;

(*b*) Carry out such functions entrusted to the League of Nations Advisory Committee on Traffic in Opium and Other Dangerous Drugs by the International Conventions on Narcotic Drugs as the Council may find necessary to assume and continue;

(*c*) Advise the Council on all matters pertaining to the control of narcotic drugs, and prepare such draft international conventions as may be necessary;

(*d*) Consider what changes may be required in the existing machinery for the international control of narcotic drugs and submit proposals thereon to the Council;

(*e*) Perform such other functions relating to narcotic drugs as the Council may direct.

Membership

The Council requested the following fifteen governments to designate one representative each to constitute the Commission (all for three years):

Canada	Mexico	United Kingdom
China	Netherlands	United States of America
Egypt	Peru	Union of Soviet Socialist Republics
France	Poland	Yugoslavia
India	Turkey	
Iran		

The Commission was also authorized by the Council to appoint, in a consultative capacity, and without the right to vote, representatives of the Permanent Central Opium Board and the Supervisory Board which were created under the terms of the International Conventions on Narcotic Drugs of 1925 and 1931, respectively.

U. S. Member: The United States member of the Commission is Harry J. Anslinger, Commissioner of Narcotics, Treasury Department.

NEW DIRECTOR OF PAN AMERICAN SANITARY BUREAU

At the Twelfth Pan American Sanitary Conference held at Caracas, Venezuela, from January 12 to January 24, 1947, Dr. Fred L. Soper of the Rockefeller Foundation was elected Director of the Pan American Sanitary Bureau, succeeding Dr. Hugh S. Cummings, Surgeon General, United States Public Health Service, retired, who was elected Director Emeritus.

DEATHS DURING WEEK ENDED JAN. 18, 1947

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Jan. 18, 1947	Corresponding week, 1946
Data for 93 large cities of the United States:		
Total deaths	9,960	10,401
Median for 3 prior years	10,401	
Total deaths, first 3 weeks of year	30,807	33,999
Deaths under 1 year of age	846	576
Median for 3 prior years	590	
Deaths under 1 year of age, first 3 weeks of year	2,523	1,831
Data from industrial insurance companies:		
Policies in force	67,232,072	67,111,222
Number of death claims	14,888	16,659
Death claims per 1,000 policies in force, annual rate	11.5	12.9
Death claims per 1,000 policies, first 3 weeks of year, annual rate	9.4	11.1

DEATHS IN 93 LARGE CITIES, 1946

[From the National Office of Vital Statistics]

Deaths	1946	1945
Total deaths (provisional)	470,184	471,729
Total deaths (final)		473,825
Infant deaths (provisional)	34,986	31,573
Infant deaths (final)		32,704

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JANUARY 25, 1947

Summary

The reported incidence of influenza continued low. A total of 4,388 cases was reported, as compared with 4,129 last week and a 5-year (1942–46) median of 4,899. Of the current total, 4,193 cases occurred in the South Atlantic, South Central, and Mountain areas, and of this number, 3,365 were reported in 3 States—Texas 2,280 (last week 1,788), South Carolina 595 (last week 713), and Virginia 490 (last week 596). No other State reported more than 149 cases, and only 7 more than 44. The total to date this year is 16,910, as compared with 116,267 for the same period last year and a 5-year median of 17,421.

The incidence of poliomyelitis continues above the median expectancy. Of 59 cases reported (last week 69, 5-year median 31), 18 occurred in California (last week 21), 5 in New York, and 3 each in Massachusetts, Michigan, Nebraska, and Florida. The total to date this year is 315, as compared with 210 for the same period last year and a 5-year median of 136.

Of the total of 2,844 cases of scarlet fever reported for the week (as compared with 2,428 last week and a 5-year median of 3,746), 1,624 were reported in the Middle Atlantic and East North Central areas (last week 1,265). To date, 9,688 cases have been reported as compared with 10,939 for the same period last year and a 5-year median of 14,150.

The incidence of whooping cough is above that for any year since 1943—2,918 cases were reported, as compared with 2,485 last week and a 5-year median of 2,459. The increase is accounted for in the Middle Atlantic and East North Central areas, where nearly 50 percent of the total was reported, and in Texas where 426 cases occurred (last week, 252). The cumulative total is 9,500, as compared with 7,336 for the corresponding period last year and a 5-year median of 8,985.

A total of 9,958 deaths was recorded for the week in 93 large cities of the United States, as compared with 9,960 last week, 10,157 and 9,734, respectively, for the corresponding weeks of 1946 and 1945, and a 3-year (1944–46) median of 10,068. The total for the year to date is 40,765, as compared with 44,156 for the same period last year.

Telegraphic morbidity reports from State health officers for the week ended Jan. 25, 1947, and comparison with corresponding week of 1946 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria: Week ended— Jan. 25, 1947	Diphtheria: Week ended— Jan. 26, 1946	Diphtheria: Median 1942-46	Influenza: Week ended— Jan. 25, 1947	Influenza: Week ended— Jan. 26, 1946	Influenza: Median 1942-46	Measles: Week ended— Jan. 25, 1947	Measles: Week ended— Jan. 26, 1946	Measles: Median 1942-46	Meningitis, meningococcus: Week ended— Jan. 25, 1947	Meningitis, meningococcus: Week ended— Jan. 26, 1946	Meningitis, meningococcus: Median 1942-46
NEW ENGLAND												
Maine	7	3	0	1	1	1	191	27	27	0	2	2
New Hampshire	0	0	0	-------	2	-------	1	5	5	1	1	1
Vermont	0	0	1	15	53	-------	123	3	7	0	1	0
Massachusetts	21	0	8	-------	-------	-------	427	181	227	1	2	4
Rhode Island	8	0	0	-------	2	-------	63	1	22	0	1	1
Connecticut	0	1	1	2	43	14	204	27	107	4	3	5
MIDDLE ATLANTIC												
New York	29	11	11	[1] 6	[1] 28	[1] 14	147	993	928	7	25	27
New Jersey	3	6	4	6	82	24	93	67	67	3	7	7
Pennsylvania	16	14	12	10	16	2	708	738	1, 137	8	16	16
EAST NORTH CENTRAL												
Ohio	17	40	11	8	31	15	380	59	111	2	10	10
Indiana	12	21	8	2	104	50	19	71	71	1	4	4
Illinois	5	6	14	3	14	13	12	556	273	1	24	16
Michigan [2]	7	13	6	2	8	2	66	628	141	5	9	6
Wisconsin	0	1	1	81	193	93	132	76	241	2	4	8
WEST NORTH CENTRAL												
Minnesota	6	6	6	-------	2	2	23	5	19	1	3	2
Iowa	8	1	8	-------	-------	-------	7	17	86	0	3	1
Missouri	6	7	5	4	13	5	10	235	96	4	4	7
North Dakota	1	1	1	1	40	14	2	2	42	0	0	0
South Dakota	0	0	0	-------	-------	-------	10	48	48	0	2	0
Nebraska	3	1	2	4	23	3	6	10	19	0	1	1
Kansas	3	15	7	75	115	10	1	204	158	0	1	1
SOUTH ATLANTIC												
Delaware	0	0	0	-------	-------	-------	-------	2	10	0	1	1
Maryland [2]	8	20	10	5	15	15	33	32	32	0	2	4
District of Columbia	0	0	0	-------	5	4	14	8	11	0	2	3
Virginia	10	13	10	490	1, 465	567	201	124	124	0	6	6
West Virginia	4	4	4	93	67	34	-------	34	34	1	4	2
North Carolina	9	12	11	-------	-------	12	171	92	92	1	3	7
South Carolina	2	11	8	595	1, 567	810	32	54	54	0	0	1
Georgia	2	6	7	22	216	183	90	34	34	2	1	5
Florida	4	10	6	16	1	7	18	42	42	2	3	3
EAST SOUTH CENTRAL												
Kentucky	4	12	7	2	189	19	2	305	97	4	5	5
Tennessee	6	8	3	60	135	105	42	86	86	7	6	6
Alabama	10	2	12	107	757	644	35	20	20	5	6	7
Mississippi [2]	7	9	7	-------	-------	-------	-------	-------	-------	2	2	5
WEST SOUTH CENTRAL												
Arkansas	7	14	8	78	429	267	14	102	102	1	11	3
Louisiana	4	6	8	29	1, 202	26	1	13	32	0	4	4
Oklahoma	4	10	10	134	543	192	1	55	11	0	0	1
Texas	26	60	57	2, 280	5, 035	2, 138	115	346	340	5	8	8
MOUNTAIN												
Montana	0	1	1	29	12	25	122	10	77	0	0	0
Idaho	1	2	1	15	79	1	5	10	25	2	0	0
Wyoming	0	0	0	6	1	37	6	87	21	0	1	0
Colorado	6	4	9	44	214	118	9	95	166	0	0	3
New Mexico	1	3	3	-------	15	5	55	2	8	0	1	0
Arizona	3	3	3	149	203	155	71	5	15	0	0	1
Utah [2]	1	0	0	89	1, 179	15	5	76	40	0	0	0
Nevada	0	0	0	-------	-------	-------	-------	1	1	0	0	0
PACIFIC												
Washington	4	7	7	1	-------	1	39	275	88	1	4	5
Oregon	3	2	4	7	71	35	36	40	68	1	2	3
California	21	38	35	17	361	155	104	759	499	4	21	21
Total	289	404	341	4, 388	14, 481	4, 899	3, 846	6, 712	10, 489	78	216	242
4 weeks	1, 277	1, 724	1, 384	16, 910	116, 267	17, 421	14, 795	20, 285	38, 101	344	909	953
Seasonal low week [3]	(27th) July 5-11			(30th) July 26-Aug. 1			(35th) Aug. 30-Sept. 5			(37th) Sept. 13-19		
Total since low	8, 848	13, 368	10, 427	49, 835	478, 515	52, 787	37, 682	46, 409	74, 114	1, 815	2, 413	2, 472

[1] New York City only.

[2] Period ended earlier than Saturday.

[3] Dates between which the approximate low week ends. The specific date will vary from year to year.

Telegraphic morbidity reports from State health officers for the week ended Jan. 25, 1947, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever [4]		
	Week ended—		Median 1942-46	Week ended—		Median 1942-46	Week ended—		Median 1942-46	Week ended—		Median 1942-46
	Jan. 25, 1947	Jan. 26, 1946		Jan. 25, 1947	Jan. 26, 1946		Jan. 25, 1947	Jan. 26, 1946		Jan. 25, 1947	Jan. 26, 1946	
NEW ENGLAND												
Maine	0	0	0	31	31	31	0	0	0	0	0	0
New Hampshire	2	0	0	2	12	14	0	0	0	0	0	0
Vermont	1	0	0	4	11	8	0	0	0	0	0	0
Massachusetts	3	0	1	154	178	324	0	0	0	3	2	2
Rhode Island	0	0	0	25	6	13	0	0	0	0	0	0
Connecticut	0	1	0	48	33	65	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York	5	2	2	323	404	404	0	0	0	3	0	3
New Jersey	1	0	0	138	82	104	0	0	0	2	0	1
Pennsylvania	2	0	0	246	254	324	0	0	0	7	2	5
EAST NORTH CENTRAL												
Ohio	1	1	1	389	249	318	0	0	0	0	0	1
Indiana	1	0	1	114	85	125	3	1	1	3	0	2
Illinois	1	2	2	162	196	252	0	0	0	1	6	1
Michigan [3]	3	2	0	154	110	207	0	0	0	0	2	1
Wisconsin	1	0	0	98	130	214	0	0	0	0	1	1
WEST NORTH CENTRAL												
Minnesota	1	0	0	66	57	93	0	0	0	0	1	0
Iowa	1	0	0	46	55	61	0	0	1	0	0	0
Missouri	0	2	0	30	60	93	0	0	0	0	0	0
North Dakota	0	0	0	6	13	13	0	0	0	0	0	0
South Dakota	0	0	0	8	34	34	0	0	0	0	0	0
Nebraska	3	0	0	36	59	59	0	0	0	0	0	0
Kansas	1	1	0	60	75	87	0	1	1	0	1	0
SOUTH ATLANTIC												
Delaware	0	0	0	15	4	6	0	0	0	0	0	0
Maryland [3]	0	0	0	37	63	81	0	0	0	1	1	1
District of Columbia	0	0	0	15	12	29	0	0	0	0	2	1
Virginia	0	0	0	40	74	74	0	0	0	1	2	2
West Virginia	0	1	0	36	30	48	0	0	0	3	0	0
North Carolina	2	0	0	34	38	63	0	0	0	0	0	0
South Carolina	0	0	0	4	9	9	0	0	0	0	1	1
Georgia	0	1	0	22	15	33	0	0	0	0	4	4
Florida	3	4	1	10	11	11	0	0	0	1	2	2
EAST SOUTH CENTRAL												
Kentucky	0	0	0	50	44	64	0	0	0	0	0	0
Tennessee	0	0	0	33	31	43	0	1	0	0	1	2
Alabama	0	0	0	11	9	16	0	0	0	1	1	1
Mississippi [3]	1	3	0	8	19	11	0	1	1	0	0	1
WEST SOUTH CENTRAL												
Arkansas	0	0	0	3	12	7	0	0	0	0	0	0
Louisiana	2	2	0	2	8	9	0	0	0	2	0	4
Oklahoma	0	2	0	13	15	22	0	0	0	0	0	0
Texas	2	4	4	49	74	65	0	0	0	2	5	3
MOUNTAIN												
Montana	1	0	0	9	8	17	0	0	0	0	0	0
Idaho	1	0	0	7	14	14	0	0	0	1	1	1
Wyoming	0	0	0	9	7	12	0	0	0	0	0	0
Colorado	0	0	1	54	40	68	0	2	0	2	0	0
New Mexico	1	0	0	11	30	9	1	0	0	0	0	0
Arizona	1	0	0	9	12	12	0	0	0	5	0	0
Utah [3]	0	0	0	24	39	53	0	0	0	0	0	0
Nevada	0	0	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	0	5	2	56	35	35	0	0	0	1	0	1
Oregon	0	2	0	25	34	34	0	0	0	0	1	1
California	18	18	9	123	302	302	0	1	1	0	4	2
Total	59	48	31	2,844	3,128	3,746	4	7	12	39	40	72
4 weeks	315	210	136	9,688	10,939	14,150	17	29	49	166	169	208
Seasonal low week [3]	(11th) Mar. 15-21			(32nd) Aug. 9-15			(35th) Aug. 30-Sept. 5			(11th) Mar. 15-21		
Total since low	25,088	13,547	12,218	36,374	49,510	53,216	71	105	166	3,694	4,420	5,214

[2] Period ended earlier than Saturday.
[3] Dates between which the approximate low week ends. The specific date will vary from year to year.
[4] Including paratyphoid fever reported separately, as follows: Massachusetts 3 (salmonella infection); New York 1; Louisiana 2; Texas 1; Colorado 1.

Telegraphic morbidity reports from State health officers for the week ended Jan. 25, 1947, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Whooping cough: Week ended— Jan. 25, 1947	Whooping cough: Week ended— Jan. 26, 1946	Whooping cough: Median 1942–46	Week ended Jan. 25, 1947: Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis, infectious	Rocky Mt. spotted fever	Tularemia	Typhus fever, endemic	Undulant fever
NEW ENGLAND											
Maine	40	26	47								
New Hampshire		10	10								1
Vermont	17	21	34								2
Massachusetts	190	89	171		2						
Rhode Island	19	42	28								
Connecticut	42	63	67	1							1
MIDDLE ATLANTIC											
New York	219	215	219	8	7		2			1	4
New Jersey	182	77	106								1
Pennsylvania	252	124	138								2
EAST NORTH CENTRAL											
Ohio	186	101	169						1		1
Indiana	48	28	22						2		8
Illinois	94	76	91	6					17		16
Michigan [3]	274	109	142		1						1
Wisconsin	194	64	97								2
WEST NORTH CENTRAL											
Minnesota	8	8	40	1							3
Iowa	15	16	16								12
Missouri	48	28	14						7		
North Dakota	1	2	4								
South Dakota	9		5			6					
Nebraska	17	6	3	5							
Kansas	21	18	43								1
SOUTH ATLANTIC											
Delaware	10	10	2								
Maryland [3]	75	27	41				1		2	2	2
District of Columbia	3	5	6								
Virginia	74	47	56	2		52			6		
West Virginia		22	30								
North Carolina	38	56	108						7	1	
South Carolina	45	61	61	2	3				3	1	
Georgia	14	8	14						9	11	2
Florida	46	12	16	4						8	1
EAST SOUTH CENTRAL											
Kentucky	27	26	50								
Tennessee	25	23	31	2			1		5	1	1
Alabama	27	15	26							4	4
Mississippi [3]									4	1	2
WEST SOUTH CENTRAL											
Arkansas	3	11	17						3		
Louisiana	6		5	2							
Oklahoma	4	10	8	1						1	1
Texas	426	110	139	13	696	55			2	15	13
MOUNTAIN											
Montana	13		19	1							
Idaho	3	9	5								
Wyoming	4	1	9								
Colorado	10	20	22								
New Mexico	16	8	4			1					
Arizona	15	11	15			43					
Utah [3]		14	23								
Nevada											
PACIFIC											
Washington	32	68	49	1		6					4
Oregon	11	7	10	1							
California	115	138	202	3	11		2			1	7
Total	2,918	1,832	2,459	48	722	163	6	0	68	47	92
Same week, 1946	1,832			28	258	89	10	0	17	55	60
Median, 1942–46	2,459			19	205	55	8	0	17	47	[4] 64
4 weeks: 1947	9,500			125	1,815	827	26	1	222	202	342
1946	7,336			163	1,422	525	32	0	104	245	246
Median, 1942–46	8,985			99	1,015	214	32	0	104	246	[4] 257

[3] Period ended earlier than Saturday.

[4] 2-year average, 1945–46.

Anthrax: New Jersey 1 case; Louisiana 2 cases.

WEEKLY REPORTS FROM CITIES [1]

City reports for week ended Jan. 18, 1947

This table lists the reports from 87 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0		0	41	0	5	0	6	0	0	8
New Hampshire:												
Concord	0	0		0		0	0	1	0	0	0	
Vermont:												
Barre	0	0		0		0	0	0	0	0	0	6
Massachusetts:												
Boston	10	0		0	18	1	16	0	24	0	0	46
Fall River	1	0		0	2	0	2	0	4	0	0	6
Springfield	2	0		0	7	0	0	0	2	0	0	4
Worcester	0	0		0	1	0	13	0	4	0	1	29
Rhode Island:												
Providence	0	0		0	21	0	7	0	5	0	0	40
Connecticut:												
Bridgeport	0	1		0	2	0	1	0	2	0	0	
Hartford	0	0		0	1	1	0	0	5	0	0	
New Haven	0	0		0	22	0	2	0	8	0	0	16
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0	1	1		0	9	0	11	0	0	8
New York	14	0	13	0	49	5	89	1	98	0	4	53
Rochester	1	0		0		0	4	0	17	0	0	1
Syracuse	0	0		0		0	0	0	15	0	0	12
New Jersey:												
Camden	0	0		0		0	5	0	2	0	0	1
Newark	0	0	3	0	1	0	4	0	15	0	0	14
Trenton	3	0	1	1	19	0	4	1	10	0	1	2
Pennsylvania:												
Philadelphia	5	0	4	2	15	2	27	0	23	0	1	55
Pittsburgh	0	0	1	0	193	1	12	1	10	0	0	8
Reading	0	0		1		0	1	0	1	0	0	4
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	0	0		1		0	6	0	13	0	0	7
Cleveland	0	0	7	0	203	0	8	0	25	0	0	28
Columbus	5	0		0		0	4	0	10	0	0	4
Indiana:												
Fort Wayne	0	0		0	2	0	0	0	3	0	0	
Indianapolis	2	1		0		0	6	0	14	0	0	26
South Bend	0	0		0		1	0	0	3	0	0	1
Terre Haute	0	0		0		0	2	0	3	0	0	
Illinois:												
Chicago	0	0	1	0	16	2	25	3	46	0	0	66
Michigan:												
Detroit	2	0		1	4	1	16	1	50	0	0	87
Flint	0	0		0		0	3	0	4	0	0	10
Grand Rapids	0	0		0	8	0	2	0	5	0	0	16
Wisconsin:												
Kenosha	0	0		0		0	0	0	3	0	0	
Milwaukee	0	0	2	2	19	0	7	0	19	0	0	30
Racine	1	0		0	1	1	0	0	5	0	0	8
Superior	0	0		0		0	0	0	1	0	0	
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0		0	1	0	0	0	1	0	0	1
Minneapolis	0	0		0	7	0	5	0	8	0	1	1
St. Paul	2	0		0	1	0	2	0	7	0	0	3
Missouri:												
Kansas City	0	0		0	1	0	7	0	7	0	0	2
St. Joseph	0	0		0		2	0	0	4	0	0	2
St. Louis	0	0	3	2	1	1	14	0	8	0	1	2

[1] In some instances the figures include nonresident cases.

City reports for week ended Jan. 18, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
Nebraska:												
Omaha	0	0		0		0	4	0	5	0	0	
Kansas:												
Topeka	0	0		1		0	4	0	0	0	0	
Wichita	0	0		0	1	0	4	1	0	0	0	6
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0		0	2	0	3	0	5	0	0	
Maryland:												
Baltimore	8	0	2	0	2	2	10	0	20	0	0	73
Cumberland	0	0		0	17	0	0	0	0	0	0	
Frederick	0	0		0		0	0	0	0	0	0	
District of Columbia:												
Washington	0	0		1	21	0	7	0	12	0	0	1
Virginia:												
Lynchburg	0	0		0		0	2	0	0	0	0	
Richmond	1	0	1	1	45	0	2	0	1	0	0	2
Roanoke	0	0		0	1	0	0	0	2	0	0	
West Virginia:												
Charleston	0	0		0		0	0	0	3	0	0	
Wheeling	0	0		0	1	0	1	0	3	0	0	
North Carolina:												
Raleigh	0	0		0		0	1	0	0	0	0	1
Wilmington	0	0		0	9	0	0	0	0	0	0	
Winston-Salem	0	0		0	36	0	1	0	3	0	0	
South Carolina:												
Charleston	0	0	7	0		0	1	0	0	0	0	2
Georgia:												
Atlanta	0	0	3	0	12	0	2	0	6	0	0	
Brunswick	0	0		0	1	0	1	0	0	0	0	
Savannah	0	0		0	38	0	0	0	0	0	0	
Florida:												
Tampa	4	0	1	0	1	1	7	0	4	0	0	2
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	2	0	1	0		0	15	2	3	0	1	9
Nashville	0	0		0		0	1	0	4	0	0	
Alabama:												
Birmingham	0	0	1	0	1	0	7	0	1	0	0	
Mobile	1	0	2	0		0	3	0	0	0	0	
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0		0		0	0	0	0	0	0	
Louisiana:												
New Orleans	3	0	3	4	5	1	5	0	5	0	0	1
Shreveport	0	0		0		0	2	0	0	0	0	
Texas:												
Dallas	1	0	1	1	2	0	2	0	2	0	0	3
Galveston	0	0		0		0	0	0	0	0	0	
Houston	0	0		0		0	5	1	4	0	1	2
San Antonio	0	0		0		0	10	0	2	0	0	
MOUNTAIN												
Montana:												
Billings	0	0		0		0	2	0	0	0	0	
Great Falls	0	0		0	72	0	1	0	1	0	0	
Helena	0	0		0	7	0	0	0	0	0	0	
Missoula	0	0		0	1	0	2	0	0	0	0	
Colorado:												
Denver	2	0	1	0	6	0	6	0	21	0	0	
Pueblo	1	0		0		0	0	0	6	0	0	
Utah:												
Salt Lake City	0	0		0	7	0	3	0	6	0	0	

City reports for week ended Jan. 18, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle	1	0	------	0	4	0	2	1	4	0	0	------
Spokane	0	0	------	0	8	0	2	0	7	0	0	4
Tacoma	0	0	------	0	1	0	0	0	1	0	0	8
California:												
Los Angeles	11	0	2	0	18	2	1	6	24	0	0	21
Sacramento	0	0	------	0	------	0	5	0	1	0	1	5
San Francisco	8	0	------	0	8	0	5	1	11	0	1	8
Total	86	2	61	19	968	24	437	20	667	0	18	745
Corresponding week, 1946	98	------	516	71	2,113	------	531	------	737	0	4	588
Average, 1942-46	76	------	790	[2] 113	[3] 2,394	------	[2] 609	------	1,213	0	10	778

[2] 3-year average, 1944-46. [3] 5-year median, 1942-46.

Dysentery, amebic.—Cases: New York 1; Chicago 1; San Francisco 1.
Dysentery, bacillary.—Cases: Chicago 1; Los Angeles 2.
Dysentery, unspecified.—Cases: Worcester 4; San Antonio 5.
Tularemia.—Cases: Washington, D. C., 1.
Typhus fever, endemic.—Cases: Savannah 1; Birmingham 2; Mobile 2; New Orleans 4; Houston 5; Los Angeles 1.

Rates (annual basis) per 100,000 population, by geographic groups, for the 87 cities in the preceding table (estimated population, 1943, 34,268,600

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England	34.0	2.6	0.0	0.0	301	5.2	120.2	2.6	157	0.0	2.6	405
Middle Atlantic	10.6	0.0	10.6	2.8	128	3.7	71.7	1.4	93	0.0	2.8	73
East North Central	6.1	0.6	6.1	2.5	152	3.1	48.4	2.5	124	0.0	0.0	174
West North Central	4.0	0.0	6.0	6.0	24	6.0	80.4	2.0	80	0.0	4.0	34
South Atlantic	21.2	0.0	22.9	3.3	304	4.9	62.1	0.0	96	0.0	0.0	132
East South Central	17.7	0.0	23.6	0.0	6	0.0	153.5	11.8	47	0.0	5.9	53
West South Central	11.5	0.0	11.5	14.3	20	2.9	68.9	2.9	37	0.0	2.9	17
Mountain	24.8	0.0	8.3	0.0	768	0.0	115.6	0.0	281	0.0	0.0	0
Pacific	23.7	0.0	3.2	0.0	46	3.2	23.7	12.7	76	0.0	3.2	57
Total	13.1	0.8	9.3	2.9	148	3.7	66.7	3.1	102	0.0	2.0	114

TERRITORIES AND POSSESSIONS

Puerto Rico

Notifiable diseases—4 weeks ended December 28, 1946.—During the 4 weeks ended December 28, 1946, cases of certain notifiable diseases were reported in Puerto Rico as follows:

Disease	Cases	Disease	Cases
Chickenpox	9	Syphilis	120
Diphtheria	49	Tetanus	2
Dysentery, unspecified	1	Tetanus, infantile	3
Gonorrhea	119	Tuberculosis (all forms)	677
Influenza	110	Typhoid fever	28
Malaria	557	Typhus fever (murine)	4
Measles	9	Whooping cough	118
Poliomyelitis	29		

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended January 4, 1947.—During the week ended January 4, 1947, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		22	2	80	370	18	16	91	77	676
Diphtheria		2		13	12	2		2		31
German measles					8		2	14	5	29
Influenza		8			12	2			4	26
Measles		195	7	15	160	152	246	306	190	1,271
Meningitis, meningococcus				3	4		1	1		9
Mumps				8	505	13	102	44	74	746
Poliomyelitis					2		1		2	5
Scarlet fever	2	6	3	49	93	1	3	8	16	176
Tuberculosis (all forms)			29	39	55	16	5	12	44	200
Typhoid and paratyphoid fever				5	1				1	7
Undulant fever				2	1				2	5
Venereal diseases:										
Gonorrhea	6	12	6	83	91	41	20	29	107	395
Syphilis		8	3	45	50	9	7	7	37	166
Whooping cough		1		23	20	1	6	4	8	63

CUBA

Habana—Communicable diseases—4 weeks ended January 4, 1947.—During the 4 weeks ended January 4, 1947, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Chickenpox	2		Poliomyelitis	2	
Diphtheria	18		Scarlet fever	1	
Malaria	8		Tuberculosis	3	1
Measles	17		Typhoid fever	26	

Provinces—Notifiable diseases—4 weeks ended December 28, 1946.—During the 4 weeks ended December 28, 1946, cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana [1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer	6	14	10	15		15	60
Chickenpox		2		1		1	4
Diphtheria	4	22	1	1	3	2	33
Hookworm disease		45					45
Leprosy		3				1	4
Malaria	2	12		4	9	149	176
Measles		21	4		3		28
Poliomyelitis		2			4		6
Scarlet fever		1					1
Tuberculosis (pulmonary)	24	34	25	46	23	35	187
Typhoid fever	10	35	6	19	6	21	97
Typhus fever	1						1
Whooping cough	1	1			15	1	18

[1] Includes the city of Habana.

FINLAND

Notifiable diseases—November 1946.—For the month of November 1946, cases of certain notifiable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	8	Paratyphoid fever	801
Diphtheria	1,136	Poliomyelitis	17
Dysentery	22	Scarlet fever	162
Gonorrhea	1,580	Syphilis	560
Lymphogranuloma inguinale	1	Typhoid fever	37

JAPAN

Notifiable diseases—4 weeks ended December 14, 1946, and total number of cases reported for the year to date.—For the 4 weeks ended December 14, 1946, and for the year to date, cases of certain notifiable diseases were reported in Japan as follows:

Disease	4 weeks ended Dec. 14, 1946	Total cases reported for the year to date	Disease	4 weeks ended Dec. 14, 1946	Total cases reported for the year to date
Cholera	9	1,213	Paratyphoid fever	516	8,850
Diphtheria	4,073	47,433	Scarlet fever	292	2,161
Dysentery, unspecified	1,652	87,518	Smallpox	72	17,768
Encephalitis, Japanese "B"	2	[1] 174	Syphilis	7,689	70,264
Gonorrhea	12,660	123,186	Typhoid fever	2,269	43,515
Malaria	993	[1] 25,841	Typhus fever	206	31,025
Meningitis, epidemic	70	1,429			

[1] For the period June 2, 1946, to date.

NORWAY

Notifiable diseases—October 1946.—During the month of October 1946, cases of certain notifiable diseases were reported in Norway as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	18	Paratyphoid fever	9
Diphtheria	258	Pneumonia (all forms)	1,521
Dysentery, unspecified	2	Poliomyelitis	186
Encephalitis, epidemic	10	Rheumatic fever	168
Erysipelas	555	Scabies	6,225
Gastroenteritis	3,310	Scarlet fever	698
Gonorrhea	1,019	Syphilis	184
Hepatitis, epidemic	580	Tuberculosis (all forms)	444
Impetigo contagiosa	5,406	Typhoid fever	4
Influenza	2,182	Undulant fever	1
Malaria	2	Weil's disease	2
Measles	159	Whooping cough	3,525
Mumps	167		

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Plague

Ecuador.—Plague has been reported in Ecuador for the month of December 1946, as follows: Chimborazo Province, 5 cases, 5 deaths; Loja Province, 4 cases, 3 deaths.

Peru.—For the month of December 1946, plague has been reported in Peru by Departments, as follows: Lambayeque, 1 case, 1 death; Libertad, 7 cases, 2 deaths; Lima, 6 cases; Piura, 5 cases.

Smallpox

China—Hong Kong.—For the week ended January 11, 1947, 35 cases of smallpox were reported in Hong Kong, China.

Malay States (Federated)—Trengganu.—Smallpox has been reported in Trengganu, Federated Malay States, as follows: Weeks ended—January 11, 1947, 293 cases, 28 deaths; January 18, 1947, 217 cases, 15 deaths.

Typhus Fever

Ecuador.—For the month of December 1946, 84 cases of typhus fever with 5 deaths were reported in Ecuador.

Eritrea.—For the week ended January 4, 1947, 53 cases of typhus fever were reported in Eritrea.

Mexico.—For the month of November 1946, 260 cases of typhus fever were reported in Mexico.

Rumania.—Typhus fever has been reported in Rumania as follows: Weeks ended—December 14, 1946, 176 cases; December 21, 1946, 189 cases.

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FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Public Health Reports

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RESTAURANT SANITATION PROGRAM OF THE UNITED STATES PUBLIC HEALTH SERVICE[1]

By A. W. FUCHS, *Sanitary Engineer Director, United States Public Health Service*

Five years have passed since my discussion of the United States Public Health Service restaurant sanitation program at the annual meeting of this association at Tulsa, Okla. (*1*). That was, I believe, the first or, at least, one of the earliest discussions on the subject of eating-establishment sanitation to appear on your programs. It is, perhaps, significant that the present paper on this subject is presented at the very meeting of this association at which consideration is to be given to the question of extending membership to food sanitarians as well as milk sanitarians.

During these 5 years, the public health problems associated with World War II have come and gone, and the restaurant sanitation program of the Public Health Service has grown from lusty infancy to vigorous maturity. The need for control of eating-establishment sanitation has been recognized as never before by State and local health authorities, by industry, and by the public. Many communities, spurred by the public clamor for cleaner food service, have inaugurated or intensified this activity.

In these endeavors, the Public Health Service acts solely in an advisory and stimulative capacity. It leaves actual enforcement to State and local health authorities, for it has no legal jurisdiction in the control of sanitary conditions except on interstate carriers, and even in this field it enlists the cooperation of State health authorities wherever possible. Its program is, therefore, designed to assist State and local regulatory agencies and other Federal agencies which have the necessary legal authority. Its aim, in brief, is to promote the

[1] Presented at the annual meeting of the International Association of Milk Sanitarians at Atlantic City, N. J., October 25, 1946.

Published concurrently in the Journal of Milk Technology.

establishment of effective, well-balanced milk and food sanitation programs in each State, to stimulate the adoption of effective State and local control legislation, and to encourage strict and uniform enforcement through appropriate legal and educational measures.

To implement these aims the Public Health Service compiles annual reports of disease outbreaks resulting from water, milk and milk products, and other foods, prepares model ordinances, undertakes and supports research on food sanitation, furnishes technical and administrative advice and interpretations of recommended standards, trains State and local sanitarians through personal contacts and regional seminars, prepares technical and educational materials for the training of sanitarians and food handlers, conducts demonstration schools for food handlers; makes surveys of State or local conditions upon request, allots funds to the States for the support of public health activities through title VI of the Social Security Act, and consults with equipment manufacturers and food-industry representatives on the design and construction of food utensils and equipment. During the war period, Public Health Service personnel were assigned to State health departments for food-sanitation duty in the more important military and war industry areas, and mobile laboratory units assisted State and local departments in areas lacking laboratory facilities.

IMPORTANCE OF FOOD-ESTABLISHMENT SANITATION

The public health control of food establishments is necessary from a number of viewpoints. To the general public which patronizes these establishments, the need is largely esthetic—it demands food service under conditions not repugnant to its sensibilities. To the restaurant industry, the meaning is principally economic—satisfied customers and avoidance of damage suits. To health officials, the problem is one of preventing food-borne disease.

Since 1923, the Public Health Service has compiled annual reports of milk-borne outbreaks of disease submitted by State health departments, and since 1938 these compilations have been extended to include outbreaks traced to water and to other foods. During the 7-year period from 1938 to 1944 there was reported an annual average of 44 outbreaks from water, 41 from milk, and 212 from other foods (table 1). In other words, outbreaks traced to other foods have been nearly three times as numerous as those from water and milk combined. Another significant feature is the trend: Whereas outbreaks attributed to water declined during the war years, and those

TABLE 1.—*Summary of disease outbreaks from water, milk, and other foods, 1938–44*

Year	Water			Milk and milk products			Other foods			Undetermined			Total		
	Outbreaks	Cases	Deaths	Outbreaks	Cases	Deaths	Outbreaks	Cases	Deaths	Outbreaks	Cases	Deaths	Outbreaks	Cases	Deaths
1938	48	[1] 31,693	17	42	1,685	27	70	2,247	25	8	882	3	168	36,507	72
1939	43	2,254	3	41	2,509	7	146	3,770	12	17	1,203	6	247	9,736	28
1940	43	[2] 44,184	9	43	1,678	10	218	5,588	30	18	1,088	1	322	52,538	50
1941	60	12,039	24	37	1,049	4	223	6,070	53	20	1,876	24	340	21,034	105
1942	53	13,271	9	45	2,142	2	245	11,420	101	37	1,878	10	380	28,711	122
1943	26	5,712	15	40	1,590	7	285	13,938	33	38	2,525	1	389	23,765	56
1944	32	2,686	1	41	1,449	20	298	14,558	45	22	1,683	1	393	20,376	67
1938–44	305	111,839	78	289	12,102	77	1,485	57,591	299	160	11,135	46	2,239	192,667	500

[1] Including a water-borne outbreak of gastroenteritis with 29,250 cases.
[2] Including a water-borne outbreak of gastroenteritis with an estimated 35,000 cases.

from milk showed no significant change, a steady increase occurred in outbreaks and cases traced to other foods. There is no doubt that the reported outbreaks and cases represent only a fraction of those actually occurring. These figures offer an obvious challenge to health officers and sanitarians to control the cause of food-borne disease. Protection of water and milk supplies deserves continued effort, but food sanitation obviously demands increased emphasis.

Of the diseases involved in food-borne outbreaks, food poisoning and gastroenteritis are by far the most common. Thus, of 298 food-borne outbreaks reported for 1944, the diseases involved were: botulism, 9; chemical food poisoning, 8; dysentery, 7; food poisoning, 157; gastroenteritis, 94; trichinosis, 7; typhoid fever, 10; others, 6. Practically all of these diseases are controllable through appropriate sanitary measures, including refrigeration.

An analysis of the reports of disease outbreaks would yield some very interesting information on the organism involved, the kind of food, and the method of contamination, but for the purposes of the present discussion an examination of the type of establishment involved may be of particular interest. This information is available for 264 of the 298 food-borne outbreaks reported for 1944, and shows the following distribution: public restaurants, 49 outbreaks; schools and colleges, 38; food shops, 31; hospitals and institutions, 29; industrial cafeterias, 19; labor camps, 16; railroad train, 1; private homes, 50; private parties, 14; picnics, 9; and church suppers, 8. The last four types of establishments, involved in 81 outbreaks, are of a private character, but the remaining 183 (70 percent of the total) are public or semipublic food places which should be subject to control by health authorities.

RECOMMENDED RESTAURANT ORDINANCE

In the paper previously mentioned (*1*), I outlined the development of the Ordinance and Code Regulating Eating and Drinking Establishments recommended by the United States Public Health Service, and discussed some of the problems involved in drafting an ordinance that would be generally applicable.

It was pointed out that the Public Health Service Sanitation Advisory Board debated the advisability of including a provision for health examinations but concluded that the conflicting opinions of health officers on the value of routine examinations of food handlers did not warrant such a requirement. Instead, the responsibility for prohibiting persons with communicable disease or in the carrier stage from handling food was placed upon the management; broad powers of control when infection is suspected were conferred on the health officer; and education of employees in food-handling sanitation was recommended.

The question of enforcement methods was settled by offering two different forms of the ordinance, one a grading type which permits enforcement by degrading or permit revocation or both, the other a nongrading minimum-requirements type enforceable by permit revocation only. In the grading type, the competitive effect of grading on public patronage tends to improve conditions in eating establishments, thereby aiding in enforcement. The provisions of the several sections of the recommended ordinance were also briefly outlined. It is unnecessary, therefore, to discuss these subjects further at this time.

The editions of 1935, 1938, and 1940 were mimeographed, but the current edition of the ordinance and code was printed in 1943 as Public Health Bulletin No. 280. It is the culmination of 9 years' effort, representing five different drafts. It embodies the best information on restaurant sanitation available in 1943, but like other codes recommended by the Public Health Service, it is subject to change as improvements are developed through research and experience. Suggestions for improvement are invited and given careful consideration by the Sanitation Advisory Board before new editions are prepared. Many proposals submitted by health officers, sanitarians, and members of the industry are now being studied.

Among the principal proposals under consideration is the broadening of the scope of the ordinance to include not only eating and drinking establishments but also all other types of food establishments. At its annual meeting in Washington in April of this year, the Conference of State and Territorial Health Officers approved the report of its Committee on Interstate and Foreign Quarantine, which

recommended that an investigation be made of the desirability of such a move. To quote from the Committee's report: "A number of State and local health departments have suggested that the Public Health Service Ordinance and Code Regulating Eating and Drinking Establishments be expanded to incorporate provisions applicable to other types of food-handling and food-processing plants, including bakeries, confectioneries, manufacturers, groceries, meat markets, slaughter houses, etc. Meat-packing plants shipping interstate are inspected by the U. S. Department of Agriculture, and interstate shipments of other food products are under the supervision of the U. S. Food and Drug Administration; but meat and food not entering interstate shipment receive only such supervision as the States and local communities may provide." Although the basic principles of sanitation of the restaurant ordinance are generally applicable to all food establishments, a careful study will be required to determine what additional provisions, particularly applicable to each type, are needed. It may be some time, therefore, before the scope of the ordinance can be widened.

Other revisions of the ordinance will undoubtedly result from research studies being conducted by official and unofficial agencies, including the Water and Sanitation Investigations Station of the Public Health Service at Cincinnati, the National Sanitation Foundation, the American Public Health Association, and laboratories that will soon be receiving research grants for sanitation studies awarded by the Public Health Service upon the recommendation of the National Advisory Health Council. To date, the Cincinnati station has investigated detergents (*2*), has developed a method for determining their over-all efficiencies (*3*), and is now engaged in a basic study of the bactericidal efficiency of quaternary ammonium compounds. The National Sanitation Foundation, supported by enlightened segments of industry, has made grants for studies on dishwashing machines, cold sterilization by chemicals, and other projects concerned with food sanitation. It has aided the Subcommittee on Food Utensil Sanitation of the American Public Health Association in studies to improve the swab test for determining residual bacteria on food utensils. To those of us who for years have needed facilities to furnish the answers to the many unsolved problems of sanitation, this ever increasing tempo of research bears promise of a new era.

The ordinance is recommended for voluntary adoption by States, counties, health districts, and municipalities in order to encourage a greater uniformity and a higher level of excellence in the sanitary control of eating and drinking establishments. The ordinance itself is only a few pages in length. The accompanying interpretative code gives the public health reason for each item, as well as details

of satisfactory compliance. By unifying the interpretation of the ordinance, the code serves to minimize enforcement misunderstandings. Paralleling the ordinance are inspection forms for field use and office-ledger record forms for posting inspection and laboratory results. Both forms are available for quantity purchase from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

No better indication of the need for sanitary control of eating places could be desired than the rapid pace at which the model ordinance has been adopted throughout the United States. This ordinance or one based thereon is now in effect, State-wide, in 15 States and the District of Columbia, as well as in 176 counties and 373 municipalities located in 37 States and Territories, with a population coverage of over 40,000,000. It has been adopted as State regulations in 25 of these States. Operating under the ordinance are 30 cities of over 100,000 population. A complete list of adoptions is available from the Public Health Service.

The grading type of ordinance is in effect in 7 States, 71 counties, and 175 municipalities; the nongrading type in 18 States, 101 counties, and 163 municipalities. The type of ordinance is not reported for 4 counties and 35 municipalities. Apparently, a nongrading ordinance or regulation is somewhat more popular than a grading type.

The editions of the Public Health Service ordinance which have been adopted are as follows: 1935, 5 cities; 1938, 6 States, 65 counties, 100 cities; 1940, 13 States, 101 counties, 144 cities; 1943, 6 States, 7 counties, 84 cities; edition unknown, 3 counties, 40 cities.

ASSISTANCE TO STATE AND LOCAL PROGRAMS

Although adequate ordinances are essential, the mere adoption of an ordinance does not guarantee proper enforcement. Much depends on the activity and intelligence of the enforcing agency and on the qualifications of its inspectors. To promote effective enforcement by State and local health authorities, the Public Health Service operates through the Milk and Food Section of the Sanitary Engineering Division in Washington, the eight district offices in the field, and the Water and Sanitation Investigations Station in Cincinnati, which does research. Each district office has on its staff two or three specialists in milk and food sanitation under the administrative direction of the district directors and under the technical supervision of the Milk and Food Section. These specialists are men of various professional backgrounds in the field of public health, including veterinarians, dairy graduates, bacteriologists, chemists, and sanitary engineers.

To assist the States in the improvement of restaurant sanitation, the Public Health Service engages in the following activities:

1. It promotes the organization of an adequate restaurant sanitation program in the State health departments, and the employment of trained sanitarians qualified to exercise leadership and offer guidance to local inspectors. Of material assistance is the allotment of funds to the States for the support of public health activities, appropriated by Congress under the authorization of title VI of the Social Security Act. According to reports received up to June 1944, legal jurisdiction over restaurant sanitation was vested in the health department in 35 States, in the agricultural or some other department in 8 States, and in both health and agricultural departments in 5 States. But even in the States where the health department does not have legal control, it invariably renders advisory service to local health agencies. Within the State health department, restaurant sanitation is a function of the engineering or sanitation division in 28 States, of the food and drug division in 7 States, of some other division in 5 States, and of the engineering, together with some other division, in 5 States.

2. Upon request, interpretations of the ordinance and code provisions and advice on technical and administrative problems are made available through correspondence with the Milk and Food Section and with the district offices, and through field consultation with the latter.

3. It trains new personnel upon request of the State health departments. This is accomplished largely by the district specialists working with State sanitarians to demonstrate proper methods of inspection, sampling, grading, rating of communities, record keeping, and administration.

4. It provides in-service training for State and local sanitarians through restaurant sanitation seminars conducted periodically in collaboration with the States on a State or regional basis. During 1945, 13 restaurant sanitation seminars were held throughout the country, with an attendance of 564 State and local sanitarians. One of the usual features of these seminars is the presentation of a course of instruction to food handlers so that sanitarians may be in a position to inaugurate such courses in their own communities.

5. Evaluations are made of State and local programs by the district specialists, upon invitation. States are assisted in making restaurant sanitation ratings of individual communities by the Public Health Service rating procedure. These ratings represent the weighted percentage compliance with the restaurant sanitation standards, and are of value in measuring results and stimulating improvement. Of the 147 communities for which reports were received

during the past few years, 29 were rated below 40 percent, 92 were between 40 and 60 percent, and 26 were above 60 percent. Some of the low ratings represented conditions prior to the inauguration of a local restaurant sanitation program. Supplies of rating forms are furnished to States upon request.

6. The cooperation of the industry is solicited in support of State and local restaurant sanitation programs and in the manufacture of food equipment and utensils of sanitary design and construction. One of the outstanding features of the past 2 years has been the restaurant industry's awakened interest in sanitation through its National, State, and local associations.[2] Adequate local control programs are approved by the most enlightened members of the industry. Manufacturers of dishwashing machines, realizing the need for improvements, are supporting basic research in this field. Although the food-equipment industry is many years behind the milk-equipment industry in the production of easily cleanable equipment, there are indications of a desire for improvement as soon as better materials are again available to the industry for new designs. A particular source of complaint has been the difficulty in cleaning cracks and crevices of chef whips and similar items. It should be clearly understood that it is the established policy of the Public Health Service to issue no approval of any patented or proprietary article or device. However, opportunity is afforded manufacturers to consult with this office on methods of compliance with recommended standards; and confidential opinions concerning local acceptance of specific materials and equipment are furnished health officers upon request.

7. Factual and technical assistance is given to writers in the preparation of articles on the need for restaurant sanitation for popular magazines.

8. During the war years, mobile trailer laboratories assigned to the district offices assisted State and local health departments in the bacteriological examination of milk supplies and restaurant utensils. The need for improvement in the sanitation of utensils is emphasized by the results obtained, during 1945, from 5,684 establishments located in 213 communities. Of over 56,000 utensils sampled, only 26 percent complied with the bacterial standard of not more than 100 organisms per utensil surface examined. Of the four types of utensils routinely examined, spoons made the best showing and cups the worst, with water and beer glasses intermediate. With the war emergency over, the mobile laboratories were discontinued in June of this year.

9. During the war period, reserve officers of the Public Health Service were assigned to State health departments for duty in impor-

[2] The National Restaurant Association recently announced the appointment of a Sanitation Committee which is planning an expanded program of cooperation with health authorities and education of employers and employees.

tant military and war-industry areas lacking adequate local health services. Among those so assigned were milk and food sanitarians. As this program was made possible through emergency funds appropriated by Congress, it, too, was discontinued in June of this year.

10. For the past three years, the Public Health Service has devoted major attention to the portion of its restaurant sanitation program concerned with the education of food handlers.

EDUCATION OF FOOD HANDLERS

Until recently, local control programs relied primarily on legal penalties, such as fines, revocation of license, or degrading, for correction of insanitary conditions. Today it is generally recognized that education of food handlers is an effective method of obtaining compliance with sanitary standards. Sanitarians have discovered that most food handlers will improve their methods and acquire sanitary habits with proper instruction, and that legal procedures may be reserved for the recalcitrant minority. The sanitarian who employs the educational rather than the legalistic approach is the one who achieves the most permanent results. The reasons should be obvious: the policeman attitude tends to create resentment and opposition rather than cooperation, and to overemphasize equipment and structural standards at the expense of methods.

Employees of food establishments should have some knowledge of food-borne disease and modes of transmission, should be thoroughly acquainted with food-handling and food-utensil sanitation, should understand the danger of working when ill or with discharging or presumably infected sores or wounds, and the importance of being meticulous about personal hygiene, particularly cleanliness of hands and finger nails.

To stimulate the development of food-handler training courses by States and cities, the Public Health Service through its district staffs inaugurated a series of demonstration schools late in 1942. Up to July 1946, 123 schools were conducted in cooperation with State and local health departments, local restaurant associations, and other civic groups, with a total attendance of 64,000 employees of food establishments. In addition, 19 schools were held for 9,700 employees of railroad and airline dining cars and commissaries; 19 schools for 1,800 food handlers on Indian reservations; 14 for 1,900 cafeteria employees at industrial plants; 11 for 813 dietitians and food handlers at hospitals; and 9 for 1,600 food handlers at military installations. Most of these courses have consisted of three 1½-hour classes or two 2-hour classes, repeated as often as was necessary to accommodate the attendance.

Largely as a result of the impetus from these demonstrations, organized food-handler schools are at present being conducted by 30 State and Territorial health departments and by at least 96 cities and counties. In some cities, a certificate of completion of a food handlers' training course is a prerequisite for employment in food establishments.

To be successful, such schools must be carefully planned, organized, and conducted. A manual for use in organizing and conducting classes for food-establishment employees, entitled "Guide to Safe Food Service" (*4*), has recently been published by the Public Health Service and is available from the Government Printing Office at 15 cents per copy. Lectures must be supported by suitable demonstrations and visual-aid materials such as booklets, posters, slides, sound slide films, and sound movies. Among the materials on restaurant sanitation developed by the Public Health Service are the following:

(1) A mimeographed outline of six lectures for food handlers' training courses.

(2) 175 lantern slides with descriptions of each, for use at food-handler schools. The use of these has been discontinued as they have been replaced by the following.

(3) A series of four sound slide films, entitled "Our Health in Your Hands," constituting a visual outline of the material that should be presented at a restaurant employees' training course. The subtitles of the four films are: (a) Germs Take Pot Luck; (b) Service With a Smile; (c) In Hot Water; (d) Safe Food for Good Health. The four films with recordings are available from Castle Films, Inc., 30 Rockefeller Plaza, New York 20, N. Y., for 10 dollars, less 10-percent discount to nonprofit institutions.

(4) A pocket-size manual of instructions for food handlers, entitled "From Hand to Mouth." Because of its simple language, its humorous illustrations, and its emphasis on the importance of the food handler's job, this booklet has achieved wide popularity. It is available from the Government Printing Office as Community Health Series No. 3, at 10 cents per single copy or 6 cents in lots of 100 or more.

(5) A series of six posters in four colors, size 10″ by 14″, entitled "For Our Patrons Health," intended for display in restaurant kitchens and wash rooms. Subtitles are: (a) Wash Your Hands Often; (b) Use a Fork—Don't Be a Butterfinger; (c) Keep These Cold; (d) Keep These Under Cover; (e) Handle With Care; and (f) Wash Every Piece Carefully. A discussion of the public health aspects of these posters appears in "Sanitary Measures Hold Restaurant Customers" (*5*). The posters are purchasable from the Government Printing Office, at 25 cents per set.

(6) An article on dishwashing for the guidance of sanitarians and the industry entitled "Methods of Sanitizing Eating and Drinking Utensils" (*6*).

(7) A list of films on milk and food sanitation.

(8) A list of references on restaurant sanitation.

Free sample copies of the posters and publications listed above are available from the Public Health Service.

Sanitarians interested in organizing food-handler schools in their communities may apply to their State health department and to the district office of the Public Health Service for assistance.

FEDERAL AGENCIES AND INTERSTATE CARRIERS

To complete the picture of Public Health Service activities in the field of food-establishment sanitation requires at least a brief mention of the advisory service to other Federal agencies and of the control of interstate carriers.

At the request of certain Federal agencies, and under formal agreements with them, the Public Health Service renders advisory and consultant field services on all aspects of sanitation at their various installations. Among these installations are the penal and correctional institutions of the Bureau of Prisons, the numerous parks of the National Park Service, the schools and institutions on Indian reservations under the Office of Indian Affairs, the resorts and camps of the Forest Service, and the blister-rust camps of the Bureau of Entomology and Plant Quarantine. The staffs of the district offices make periodic inspections of such phases of environmental sanitation as water supply, sewage disposal, garbage disposal, dairies and pasteurization plants, insect and rodent control, as well as eating facilities. Recommendations for improvements are discussed with resident supervisors and are included in written reports to the appropriate agencies. In addition, courses of instruction are given for the food handlers at these institutions. A similar service has recently been inaugurated for the hospitals of the Public Health Service. Furthermore, sanitary-engineer and sanitarian officers are assigned to full-time duty with other Federal agencies including UNRRA, FPHA, FHA, Veterans' Emergency Housing Program, Pan American Sanitary Bureau, Office of Labor of the Production and Marketing Administration, and Bureau of Prisons.

Finally, a few words concerning the only food-sanitation activity with which the Public Health Service is legally charged—the supervision of interstate carriers. This program is authorized by the Public Health Service Act, Public Law 410 (July 1, 1944), and the Interstate Quarantine Regulations which are now undergoing revision

in accordance with this act. Its purpose is to protect the health of interstate travelers and prevent the spread of disease from one State ther. Periodic inspections are made of sources of water, milk, shell[illegible], and other food served on vehicles of railways, airlines, and vessel companies engaged in interstate traffic, as well as methods of food handling in dining cars, coaches, galleys, and at commissaries. Sources are either approved, provisionally approved for a limited period pending correction of substandard conditions, or prohibited. Many courses of instruction have been organized for food handlers employed by the carriers. Supervision of this activity is divided among the Land and Air Carrier Section, the Vessel Sanitation Section, and the Milk and Food Section of the Sanitary Engineering Division at Washington, and the district offices in the field. Owing to its limited staff, however, the Public Health Service could not begin to do justice to this program without the active cooperation of the several State health departments.

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SICKNESS ABSENTEEISM AMONG INDUSTRIAL WORKERS, SECOND AND THIRD QUARTERS OF 1946 [1]

By W. M. Gafafer, *Principal Statistician, United States Public Health Service*

An analysis is herewith presented of the morbidity experience of 200,000 male workers during the second and third quarters of 1946. The basic data representing disabilities of more than 1 week are derived from periodic reports from industrial sick benefit associations, company relief departments, and group insurance plans.

[1] From Industrial Hygiene Division, Bureau of State Services. The report for first quarter appeared in Public Health Reports, 61: 1664–1666 (Nov. 15, 1946).

SECOND QUARTER, 1946

Table 1 gives average annual frequency rates for disabilities beginning in the second quarters of 1946 and 1945 according to specific

TABLE 1.—*Average annual number of absences per 1,000 males on account of sickness and nonindustrial injuries disabling for eight consecutive calendar days or longer, by cause, experience of MALE employees in various industries, second quarter of 1946 compared with second quarter of 1945, and first half of 1946 compared with first halves of the years 1941 to 1945, inclusive* [1]

Cause (numbers in parentheses are disease title numbers from International List of Causes of Death, 1939)	Annual number of absences per 1,000 males				
	Second quarter		First half		
	1946	1945	1946	1945	1941-45
Sickness and nonindustrial injuries	100.3	138.0	127.5	154.8	135.6
Nonindustrial injuries (169-195)	11.8	12.1	12.3	14.2	11.9
Sickness	88.5	125.9	115.2	140.6	123.7
Respiratory diseases	27.0	46.8	48.7	60.6	62.3
Tuberculosis of respiratory system (13)	.5	.6	.7	.7	.8
Influenza, grippe (33)	7.1	15.2	21.3	21.4	26.9
Bronchitis, acute and chronic (106)	4.4	8.2	6.5	11.0	9.6
Pneumonia, all forms (107-109)	2.9	5.3	4.8	6.5	8.0
Diseases of pharynx and tonsils (115b, 115c)	4.8	6.9	4.9	7.1	6.9
Other respiratory diseases (104, 105, 110-114)	7.3	10.6	10.5	13.9	10.1
Digestive diseases	15.8	21.2	16.7	21.1	17.1
Diseases of stomach except cancer (117, 118)	4.4	7.4	4.8	7.6	5.4
Diarrhea and enteritis (120)	1.9	2.7	2.0	2.6	1.9
Appendicitis (121)	3.6	4.5	3.4	4.3	4.7
Hernia (122a)	2.8	2.9	3.1	2.8	2.0
Other digestive diseases (115a, 115d, 116, 122b-129)	3.1	3.7	3.4	3.8	3.1
Nonrespiratory-nondigestive diseases	42.5	51.7	46.1	52.9	40.2
Infectious and parasitic diseases (1-12, 14-24, 26-29, 31, 32, 34-44) [2]	3.8	3.3	3.7	3.4	3.0
Rheumatism, acute and chronic (58, 59)	4.8	7.5	5.2	7.4	5.3
Neurasthenia and the like (part of 84d)	2.3	3.0	2.1	2.7	1.6
Neuralgia, neuritis, sciatica (87b)	2.8	3.8	3.0	3.9	2.8
Other diseases of nervous system (80-85, 87, except part of 84d and 87b)	1.7	2.0	1.9	2.3	1.6
Diseases of heart and arteries, and nephritis (90-99, 102, 130-132)	7.5	8.7	8.0	8.9	6.1
Other diseases of genitourinary system (133-138)	2.7	3.3	3.1	3.4	2.9
Diseases of skin (151-153)	3.3	3.7	3.6	3.7	3.0
Diseases of organs of movement except diseases of joints (156b)	3.0	3.9	3.5	4.1	3.5
All other diseases (45-57, 60-79, 88, 89, 100, 101, 103, 154, 155, 156a, 157, 162)	10.6	12.5	12.0	13.1	10.4
Ill-defined and unknown causes (200)	3.2	6.2	3.7	6.0	4.1
Average number of males	198,218	220,740	196,325	223,511	1,221,066

[1] Industrial injuries and venereal diseases are not included.
[2] Exclusive of influenza and grippe, respiratory tuberculosis, and venereal diseases.

cause. It will be observed that notable decreases are recorded in the 1946 frequencies for all causes and each broad cause group, the rate for all sickness and nonindustrial injuries being more than 25 percent below the corresponding rate for 1945. Among the broad cause groups, the respiratory diseases reveal the most marked drop in frequency, over 40 percent, while decreases of 25 and 18 percent, respectively, occur in the frequency of digestive, and nonrespiratory-nondigestive diseases.

THIRD QUARTER, 1946

Average annual frequency rates by cause are shown in table 2 for disabilities beginning in the third quarters of 1946 and 1945. An examination of the table reveals that the relatively low frequencies observed in the second quarter of 1946 continue into the third quarter of the year, each cause of disability shown in table 2 occurring less frequently in the third quarter of 1946 than in the corresponding quarter of 1945.

TABLE 2.—*Average annual number of absences per 1,000 males on account of sickness and nonindustrial injuries disabling for eight consecutive calendar days or longer, by cause, experience of MALE employees in various industries, third quarter of 1946 compared with third quarter of 1945, and first 9 months of 1946 compared with first 9 months of the years 1941 to 1945, inclusive* [1]

Cause (numbers in parentheses are disease title numbers from International List of Causes of Death, 1939)	Annual number of absences per 1,000 males				
	Third quarter		First nine months		
	1946	1945	1946	1945	1941–45
Sickness and nonindustrial injuries	91.0	120.1	115.5	143.5	125.1
Nonindustrial injuries (169–195)	11.9	12.3	12.2	13.6	12.2
Sickness	79.1	107.8	103.3	129.9	112.9
Respiratory diseases	22.1	29.7	39.8	50.6	50.8
Tuberculosis of respiratory system (13)	.7	.8	.7	.7	.8
Influenza, grippe (33)	5.5	8.5	16.0	17.2	20.5
Bronchitis, acute and chronic (106)	3.7	5.4	5.6	9.2	8.1
Pneumonia, all forms (107–109)	2.0	2.9	3.8	5.4	6.2
Diseases of pharynx and tonsils (115b, 115c)	3.4	4.2	4.4	6.1	6.2
Other respiratory diseases (104, 105, 110–114)	6.8	7.9	9.3	12.0	9.0
Digestive diseases	14.5	21.2	16.0	21.1	17.8
Diseases of stomach except cancer (117, 118)	4.7	8.4	4.8	7.8	5.7
Diarrhea and enteritis (120)	2.1	2.8	2.0	2.7	2.2
Appendicitis (121)	2.6	3.3	3.1	4.0	4.7
Hernia (122a)	2.1	2.8	2.8	2.8	2.0
Other digestive diseases (115a, 115d, 116, 122b–129)	3.0	3.9	3.3	3.8	3.2
Nonrespiratory-nondigestive diseases	38.8	51.1	43.8	52.3	40.1
Infectious and parasitic diseases (1–12, 14–24, 26–29, 31, 32, 34–44) [2]	2.3	2.5	3.2	3.1	2.7
Rheumatism, acute and chronic (58, 59)	4.2	6.4	4.9	7.1	5.1
Neurasthenia and the like (part of 84d)	2.0	3.0	2.1	2.8	1.7
Neuralgia, neuritis, sciatica (87b)	3.0	4.1	3.0	4.0	2.8
Other diseases of nervous system (80–85, 87, except part of 84d, and 87b)	2.1	2.4	2.0	2.3	1.6
Diseases of heart and arteries, and nephritis (90–99, 102, 130–132)	5.1	8.0	7.1	8.6	5.9
Other diseases of genitourinary system (133–138)	3.0	4.2	3.1	3.7	3.0
Diseases of skin (151–153)	3.8	4.0	3.6	3.8	3.3
Diseases of organs of movement except diseases of joints (156b)	3.2	3.4	3.4	3.8	3.4
All other diseases (45–57, 60–79, 88, 89, 100, 101, 103, 154, 155, 156a, 157, 162)	10.1	13.1	11.4	13.1	10.6
Ill-defined and unknown causes (200)	3.7	5.8	3.7	5.9	4.2
Average number of males	194,607	209,427	195,752	218,816	1,222,320

[1] Industrial injuries and venereal diseases are not included.
[2] Exclusive of influenza and grippe, respiratory tuberculosis, and venereal diseases.

SECOND AND THIRD QUARTERS, 1937–46

An investigation of the behavior of second- and third-quarter frequencies for all causes and four broad cause groups over the 10 years, 1937–46, is made possible by means of figure 1 presenting

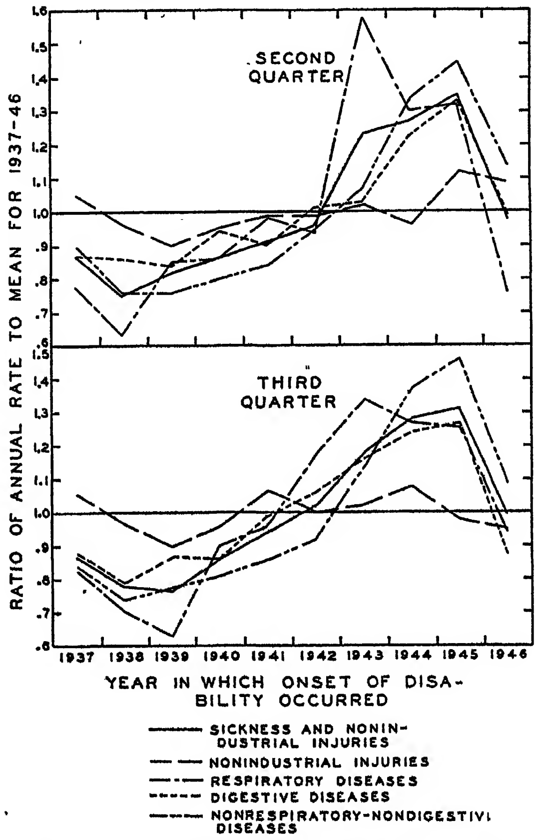

FIGURE 1.—Ratio of average annual number of absences per 1,000 males on account of sickness and nonindustrial injuries disabling for eight consecutive calendar days or longer to mean rate for 1937–46, by broad cause group, variation of second- and third-quarter ratios with time, experience of MALE employees in various industries, 1937 to 1946, inclusive.

graphically the ratios of the average annual frequency rates to the corresponding mean rate for the 10-year period. These ratios are useful in determining the percentage by which a particular rate exceeds or falls short of its 10-year mean. Thus, in the second quarter of 1946, the ratio of the average annual number of absences per 1,000 males on account of respiratory diseases to the mean respiratory rate for the 10 second quarters is 0.76, or, in other words, the 1946 respiratory rate is 24 percent below the mean rate for the 10-year period. The 1946 second-quarter ratio for nonrespiratory-nondigestive diseases, on the other hand, is 1.14 indicating an excess of 14 percent

in the 1946 rate when compared with the mean nonrespiratory-nondigestive rate for the 10 second quarters.

The mean rates for the 10-year period entering the determination of the ratios are shown in the following table:

Broad cause group:	Average annual number of absences per 1,000 males, 1937-46 (mean) Second quarter	Third quarter
Sickness and nonindustrial injuries	102.2	91.7
Nonindustrial injuries	10.8	12.5
Respiratory diseases	35.4	23.5
Digestive diseases	16.0	16.7
Nonrespiratory-nondigestive diseases	40.0	39.0

An examination of figure 1 reveals a number of notable relationships which may be briefly summarized as follows:

(1) The behavior over the 10-year period of second- and third-quarter ratios for a particular cause group and for all causes is remarkably similar in the two quarters.

(2) In each quarter, variation in the ratios for nonindustrial injuries appears to be due principally to chance fluctuations, while variation in the ratios for all causes and the broad sickness groups seems to reflect the operation of factors other than chance.

(3) Peak ratios for the respiratory diseases are recorded for the second and third quarters of 1943, the second-quarter rate for that year being over 50 percent above the corresponding mean rate for 1937–46, and representing the highest ratio yielded in the second quarter for any of the cause groups.

(4) For all causes, digestive diseases, and nonrespiratory-nondigestive diseases, peak ratios were reached in 1945, the third-quarter rate for nonrespiratory-nondigestive diseases in that year being over 45 percent above the corresponding 10-year mean, and representing the highest ratio yielded in the third quarter for any of the cause groups.

CHANGES IN STATE AND TERRITORIAL HEALTH AUTHORITIES

Change No. 5 to Directory of State and Territorial Health Authorities (Supplement No. 180 to Public Health Reports—1945 Revision)

The following changes and additions have been received since compilation of Change No. 4.[1] Notice of further changes should be addressed to the Records and Reports Unit, Bureau of States Services, United States Public Health Service, Washington 25, D. C.

[1] Change No. 1 appeared in PUBLIC HEALTH REPORTS, 61: 1386–1387 (Sept. 20, 1946); Change No. 2, 61: 1544–1547 (Oct. 25, 1946); Change No. 3, 61: 1701–1703 (Nov. 22, 1946); Change No. 4, 61: 1883–1885 (Dec. 27, 1946).

ALABAMA STATE DEPT. OF HEALTH

Delete: **B. F. Austin, M. D., M. P. H.,** State Health Officer
Insert: **D. G. Gill, M. D., D. P. H.,** State Health Officer

KENTUCKY STATE DEPT. OF HEALTH

Miscellaneous activities:
Add:
Medical and related services—
W. B. Atkinson, M. D., acting director
Division of Medical and Related Services.

MINNESOTA STATE BOARD OF HEALTH

Sanitation activities:
General sanitation—
Insert: **Herbert M. Bosch, M. P. H.,** director
Division of Sanitation.

MISSOURI STATE BOARD OF HEALTH

Dental services:
Insert: **Cyril Friend, D. D. S., M. P. H.,** acting director
Public Health Dentistry
Section of Preventive Medicine.
Nutrition:
Delete: **Mary Reeves,** junior nutritionist
Division of Child Hygiene
Insert: **L. M. Garner, M. D., M. P. H.,** director
Section of Preventive Medicine
Sanitation activities:
Food sanitation—
Insert: **Bruce Ford,** intermediate sanitarian
Milk sanitation—
Delete: **Warren Loften,** director
Insert: **Charles E. Carl,** principal public health engineer
Food and Drug
Section of Environmental Sanitation.
Venereal disease control:
Insert: **C. W. Meinershagen, M. D.,** director
Venereal Disease Control Services
Section of Preventive Medicine.
Vital records:
Delete: **Madge Kennedy**
Insert: **Elwood Musselman,** director
Section of Statistics.

MONTANA STATE DEPT. OF PUBLIC HEALTH

Dental services:
Insert: **Francis I. Livingston, D. D. S., M. P. H.,** director
Division of Dental Hygiene.

NEW JERSEY STATE DEPT. OF HEALTH

Administration, general:
Delete: **Edmund R. Outcalt,** chief
Bureau of Administration
Insert: **Charles M. Callahan,** chief
Division of Personnel, Administration, Records, and Accounts.
Personnel administration:
Delete: **Charles M. Callahan**
Insert: **Mary F. Bourbon,** administrative assistant.
Add:
Cancer services:
Raymond D. Brokow, M. D., chief
Division of Cancer Control.
School health services:
Julius Levy, M. D., consultant
Division of Maternal and Child Health.
Venereal disease control:
Delete: **Daniel Bergsma, M. D.,** chief.

PENNSYLVANIA STATE DEPT. OF HEALTH

Delete: **Harry W. Weest, M. D.,** Secretary of Health
Insert: **Norris W. Vaux, M. D.,** Secretary of Health

TEXAS STATE DEPT. OF HEALTH

Administration, general:
Accounting and financing, and Personnel administration—
Delete: **P. A. Kerby,** business officer
Insert: **Ed Riedel,** business officer.
Communicable disease control, general:
Delete: **J. V. Irons, Sc. D.,** director
Insert: **W. S. Brumage, M. D.,** director
Division of Epidemiology.
Laboratory services:
Delete: **S. W. Bohls, M. D.,** director
Insert: **J. V. Irons, Sc. D.,** director
Bureau of Laboratories.
Sanitation activities:
Food sanitation, and Milk sanitation—
Delete: **T. H. Johnson,** acting director
Insert: **Joe F. Lakey,** director
Division of Food and Drug.
Venereal disease control:
Delete: **T. E. Dodd, M. D., M. P. H.,** director
Insert: **R. S. Lloyd, M. D.,** director
Division of Venereal Disease.

VIRGINIA DEPT. OF HEALTH

Crippled children's services:
- Delete: **G. W. Comstock, M. D.,** acting director
- Insert: **Samuel C. Ingraham II, M. D.,** director
- Bureau of Crippled Children

Add:
- Cancer services:
  - **George R. Carpenter, M. D.,** director
  - Bureau of Cancer Control.

Tuberculosis control:
- Field services—
  - Delete: **G. W. Comstock, M. D.,** acting director
  - Insert: **S. C. Ingraham II, M. D.,** director
  - Bureau of Tuberculosis Out-Patient Service.

Vital records:
- Delete: **Walter A. Plecker, M. D.,** director
- Bureau of Vital Statistics.

WASHINGTON STATE DEPT. OF HEALTH

Dental services:
- Delete: **Francis I. Livingston, D. D. S., M. P. H.,** head
- Dental Hygiene Section.

PUBLICATION OF LISTS OF SANITARY RATINGS OF INTERSTATE MILK SHIPPERS

The following circular letter, addressed to all State milk control authorities, is reprinted for the information of health officers in areas experiencing milk shortages.

Upon the recommendation of the Conference of State and Territorial Health Officers, the United States Public Health Service is undertaking to issue periodically a list of interstate milk shippers and of supplies available for interstate shipment. These lists are intended to acquaint areas experiencing milk shortages with available sources and their sanitary ratings. Health officers of cities actually experiencing shortages will be in position to authorize the receipt by local milk plants of supplies from listed sources with the highest sanitary ratings. Application by shippers for listing as well as acceptance of listed supplies by any city will be entirely optional. Lists will be published quarterly, or oftener if necessary, beginning March 1, 1947, and will show sources of raw milk for pasteurization, pasteurized milk, and later cream and possibly other fluid milk products.

In order that health authorities of receiving areas may feel justified in accepting shipments from beyond their milk sheds without sending their own inspectors to the producing areas, the plan provides for the rating by the State of origin of sources which apply for listing, and for spot checks by the Public Health Service of the State's inspection, laboratory, and rating procedures to insure uniformity and to protect receiving areas against laxity. Ratings will be made and computed in accordance with the Public Health Service rating procedure which has been employed for years by many of the States. The rating figure indicates the weighted percentage compliance with the grade A standards of the Milk Ordinance and Code recommended by the Public Health Service. Receiving areas operating under the PHS milk ordinance may, in accordance with Section 11, accept as grade A the outside sources rating 90 percent or more, provided that the bacterial counts and the temperatures of the milk upon receipt are satisfactory. A proposed revision of the rating procedure to assign greater weight than the present 15 percent to bacterial quality and to provide for partial credits for higher counts will be considered at the next meeting of the PHS Sanitation Advisory Board.

No source will be retained on the list when its rating becomes more than 12 months old. Each State rating will be based on data obtained within the preceding 6 months, including an inspection of, and four samples from, each producing farm and each receiving station and plant included in the survey. Before rating a source, the State sanitarian will obtain a list of all producing farms actually contributing to the supply to be shipped. If the number is less than

25, all should be inspected; if 25 or more, a sufficient number should be selected at random for inspection to reduce the probable error for each item of sanitation to less than 5 percent (see table, p. 3, Reprint 1970 from Public Health Reports), in which case the probable error of the entire rating will be less than 1 percent. Thus, at least 25 producers must be inspected out of 50, 32 out of 100, 38 out of 200, 42 out of 500, and 44 out of 1,000. A truly random selection should be made, as by picking names out of a hat or by dividing the area into districts and selecting one or two roads in each district. Although inspections by local authorities may not be used for rating purposes, the State may accept reports from local official laboratories that have been approved by the State laboratory director as complying substantially with APHA Standard Methods and as checking within 10 percent on results obtained at least twice a year on split samples.

A rating report of each source for which listing is desired should be computed and submitted by the State to the appropriate District Office of the Public Health Service. For each source all producers inspected should be listed, with their violations, on page 3 of milk rating form 9421, and the receiving station and the pasteurization plant, if any, on page 4. The rating forms may be obtained without cost from the Public Health Service. The inspection forms, from which the field data are transferred to the rating form, are purchasable from the Government Printing Office in Washington at 35 cents per 100 for the producer form 8976–D and 40 cents per 100 for the plant form 8978–C. For each source the following additional data should be submitted: name and location of source, kind and volume of supply available at different seasons, total number of producers, number inspected, date of inspection, inspector's name, date inspector was last spot checked by PHS, last four counts (or reduction times) and delivery temperatures for each producer and the last four counts (or reduction times) of the mixed milk (if mixed), name and location of laboratory, date of last check by State (if a local laboratory), and date of last laboratory spot check by PHS.

To inaugurate the program, the State health or other supervisory agency which is in position to participate should circularize milk plants and receiving stations in the State with a view to receiving applications for ratings from sources which ship or desire to ship interstate. The State agency should assign a competent milk sanitarian to the rating activity. Detailed information and guidance concerning standards and rating procedures may be obtained from the PHS District Office.

Upon receipt of rating reports from the State, the PHS District Office will check all data and computations for completeness and accuracy. If satisfied from previous spot checks that the State sanitarian's inspection and rating methods and the laboratory's procedures are satisfactory, the District Office will forward to the Milk and Food Section in Washington all pertinent data for listing. The District Office will spot check annually the rating methods of each State sanitarian assigned to this activity, to determine agreement within five points, and will request the PHS Cincinnati Station to spot check annually the laboratories whose results are used by the State for the rating of sources, to determine substantial compliance with APHA Standard Methods.

Any suggestions you may have for improving this program will be given careful consideration.

THOMAS PARRAN
Surgeon General

INCIDENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES

December 29, 1946—January 25, 1947

The accompanying table summarizes the incidence of nine important communicable diseases, based on weekly telegraphic reports from State health departments. The reports from each State for each week are published in PUBLIC HEALTH REPORTS under the section "Incidence of Disease." The table gives the number of cases of these diseases for the 4 weeks ended January 25, 1947, the number reported for the corresponding period in 1946, and the median number for the years 1942–46.

DISEASES ABOVE MEDIAN INCIDENCE

Poliomyelitis.—The number of cases of poliomyelitis dropped from 688 during the preceding 4-week period to 315 during the 4 weeks ended January 25. The current incidence was, however, relatively high, the number of cases being 1.6 times the 1946 figure for this period and 2.6 times the 1942–46 median. Seven of the geographic sections reported a higher incidence than in 1946, and 2 reported approximately the same number of cases as in 1946. All sections reported an excess over the 5-year median expectancy. In 1943 and 1944 the incidence of this disease reached peaks of approximately 12,000 and 19,000 cases, respectively. In 1945 the cases dropped to 14,000, but during 1946 a peak of 25,000 cases was reached, which was the highest number of cases on record since the great epidemic of 1916 when 29,000 cases were reported. It is significant that the current incidence represents a 60-percent increase over the 1946 incidence for these first 4 weeks of the year.

Whooping cough.—The number of cases (9,500) of whooping cough reported for the current 4 weeks was relatively high—about 35 percent above the 1946 figure and 5 percent above the 1942–46 median for the corresponding period. Increases over the normal expectancy occurred in 4 of the geographic sections, but in the other 5 sections the numbers of cases were below the 1942–46 median figures. For the entire country the current incidence was the highest for this period since 1943 when approximately 16,000 cases were reported.

DISEASES BELOW MEDIAN INCIDENCE

Diphtheria.—For the 4 weeks ended January 25 there were 1,277 cases of diphtheria reported, as compared with 1,724 during the corresponding 4-week period in 1946 and a 5-year (1942–46) median of 1,384 cases. The New England, Middle Atlantic, and East South Central sections reported excesses over the normal median expectancy, but in the other sections the incidence either approximated the median

or fell considerably below it. For the country as a whole the current incidence was the lowest for this period since 1944 when 1,059 cases were reported for the corresponding 4 weeks.

Influenza.—The number of reported cases (16,910) of influenza was about 15 percent of the 1946 incidence during these same weeks, but it was slightly below the 1942–46 median. Within the median period 1942–46 there were 2 influenza epidemics, one in 1943–44 and the other the 1945–46 epidemic when the reported cases for the 4 weeks corresponding to the current 4 weeks totaled approximately 261,000 and 116,000, respectively. The current incidence compares with the incidence during the more normal influenza season of 1944–45. In each section of the country the current incidence was below that of 1946, and in each section, except the Mountain, the number of cases was lower than the median expectancy.

Measles.—The number of cases of measles rose from 9,900 during the preceding 4 weeks to 14,716 during the 4 weeks ended January 25. The current incidence was less than 75 percent of the incidence for the corresponding period in 1946 and about 40 percent of the preceding 5-year median. The New England and South Atlantic sections reported a relatively high incidence, but in all other sections the incidence was considerably below the normal seasonal expectancy.

Meningococcus meningitis.—The number of cases (341) of meningococcus meningitis reported for the current period was less than 40 percent of the 1942–46 median. Although the number of cases of this disease had been gradually declining after a period of unusually high rates, the incidence has not yet dropped to the average in non-epidemic years (approximately 220 cases). In each section of the country the number of cases was less than 50 percent of the preceding 5-year median.

Scarlet fever.—The incidence of scarlet fever was also relatively low, the number of cases (9,525) reported being less than 90 percent of the 1945 incidence and less than 70 percent of the 1942–46 median. For the country as a whole the current incidence was the lowest in the 18 years of record for this period. In each section of the country the number of cases reported was less than the preceding 5-year median expectancy.

Smallpox.—For the current 4-week period there were 17 cases of smallpox reported, as compared with 29 for the corresponding weeks in 1946 and a 1942–46 median of 49 cases. Nine of the total cases were reported from the East North Central section, the figure being slightly above the 5-year median expectancy (7 cases); the remaining cases were widely distributed over the other sections of the country.

Typhoid and paratyphoid fever.—The incidence of these diseases continued at a relatively low level. The 165 cases reported for the

current 4-week period was only slightly below the 1945 incidence, but it was less than 80 percent of the 1942–46 median. The number of cases was higher than the preceding 5-year median in the New England, and East South Central sections; about normal in the West North Central, Mountain and Pacific sections; and below the normal seasonal incidence in the Middle Atlantic, South Atlantic, and West South Central sections. For the entire country the current incidence was the lowest in the 18 years of record for this period of the year.

MORTALITY, ALL CAUSES

For the 4 weeks ended January 25 there were 40,765 deaths from all causes reported to the Bureau of the Census by 93 large cities. The median number of deaths reported for the same weeks in 1944–46 was 44,057. For each week of the current 4-week period the number of deaths was less than the preceding 3-year median; for the 4 weeks ended January 25 the number of deaths was about 7 percent less than the 3-year median for the corresponding weeks.

Number of reported cases of 9 communicable diseases in the United States during the 4-week period Dec. 29, 1946–Jan. 25, 1947, the number for the corresponding period in 1946, and the median number of cases reported for the corresponding period, 1942–46

Division	Current period	1946	5-year median	Current period	1946	5-year median	Current period	1946	5-year median
	Diphtheria			Influenza [1]			Measles [2]		
United States	1, 277	1, 724	1, 384	16, 910	116, 267	17, 421	14, 756	20, 285	36, 101
New England	95	46	37	73	986	147	3, 834	1, 087	2, 720
Middle Atlantic	185	156	152	86	571	187	4, 435	4, 731	7, 049
East North Central	168	292	168	223	3, 264	571	2, 054	3, 906	3, 786
West North Central	93	127	117	399	6, 341	404	228	1, 786	2, 033
South Atlantic	229	373	263	5, 530	25, 930	6, 163	2, 090	1, 498	1, 498
East South Central	149	143	129	438	11, 164	1, 900	186	1, 112	1, 059
West South Central	180	345	342	8, 804	54, 673	9, 774	425	1, 168	1, 168
Mountain	57	66	60	1, 248	10, 851	1, 181	1, 000	1, 265	2, 149
Pacific	121	176	158	109	2, 487	738	495	3, 732	3, 732
	Meningococcus meningitis			Poliomyelitis			Scarlet fever		
United States	340	907	953	315	200	119	9, 525	10, 849	14, 150
New England	22	40	43	13	7	7	1, 020	1, 060	1, 660
Middle Atlantic	61	192	205	27	29	21	2, 228	2, 337	3, 052
East North Central	50	174	165	67	29	21	2, 953	2, 652	4, 059
West North Central	35	56	79	37	13	9	813	1, 000	1, 557
South Atlantic	52	130	131	30	14	12	781	1, 014	1, 378
East South Central	43	91	91	18	12	10	365	453	693
West South Central	34	88	88	29	31	24	211	576	484
Mountain	11	25	25	20	13	10	445	526	929
Pacific	32	111	111	74	. 52	32	709	1, 171	1, 171
	Smallpox			Typhoid and paratyphoid fever			Whooping cough [2]		
United States	17	29	49	165	169	211	9, 500	7, 115	8, 985
New England	0	0	0	18	6	7	1, 127	1, 092	1, 298
Middle Atlantic	0	0	0	28	18	33	2, 328	2, 029	2, 029
East North Central	9	3	7	19	24	24	2, 499	1, 268	1, 529
West North Central	2	3	7	10	9	9	272	224	444
South Atlantic	1	1	3	16	38	39	1, 098	951	1, 457
East South Central	2	4	6	20	14	14	309	227	346
West South Central	2	5	6	27	35	36	1, 136	535	655
Mountain	1	11	9	14	12	12	174	267	356
Pacific	0	2	2	13	13	14	497	522	970

[1] Mississippi and New York excluded; New York City included. [2] Mississippi excluded.

727076—47——4

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED FEBRUARY 1, 1947

Summary

The incidence of influenza declined during the current week. Of the total of 3,432 cases reported, as compared with 4,388 last week, 2,582, or 75 percent of the total, occurred in the 3 States (Texas, South Carolina, and Virginia) previously reporting approximately the same proportion of the incidence this year. Only 8 other States reported more than 32 cases. These 11 States reported as follows (last week's figures in parentheses): *Increases*—Vermont 38 (15), North Dakota 43 (1, next earlier week 34), South Carolina 633 (595), Alabama 149 (107), Colorado 48 (44), Arizona 156 (149); *decreases*—Virginia 430 (490), West Virginia 39 (93), Arkansas 53 (78), Oklahoma 83 (134), Texas 1,519 (2,280). The total for the year to date is 20,342, as compared with 130,522 for the same period last year and a 5-year (1942–46) median of 22,592.

Of the 58 cases of poliomyelitis reported for the week (last week 59), more than recorded for a corresponding week since 1928, New York and California reported 8 each (last week 5 and 18, respectively), and Michigan and Florida 4 each (last week 3 each). The total for the first 5 weeks of the year is 373, as compared with 248 for the same period last year and a 5-year median of 164.

A total of 77 cases of undulant fever was reported, as compared with 92 last week and an average of 85 for the past 4 weeks. The total to date is 419, as compared with 321 and 354, respectively, for the same periods of last year and 1945.

Below the respective corresponding medians, both for the current week and for the first 5 weeks of the year, are the figures for diphtheria, infectious encephalitis, measles, meningococcus meningitis, scarlet fever, smallpox, and typhoid and paratyphoid fever. The figures for whooping cough, both current and cumulative, are slightly above the medians. The current total for typhus fever is 69 (last week 47, median 50). The cumulative figure is 219, as compared with a 5-year median of 296.

Deaths recorded for the week in 93 large cities of the United States totaled 9,602, as compared with 9,958 last week, 10,100 and 10,069, respectively, for the corresponding weeks of 1946 and 1945, and a 3-year (1944–46) median of 10,069. The cumulative total is 50,367, as compared with 54,256 for the corresponding period last year.

Telegraphic morbidity reports from State health officers for the week ended Feb. 1, 1947, and comparison with corresponding week of 1946 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended— Feb. 1, 1947	Week ended— Feb. 2, 1946	Median 1942–46	Week ended— Feb. 1, 1947	Week ended— Feb. 2, 1946	Median 1942–46	Week ended— Feb. 1, 1947	Week ended— Feb. 2, 1946	Median 1942–46	Week ended— Feb. 1, 1947	Week ended— Feb. 2, 1946	Median 1942–46
NEW ENGLAND												
Maine	0	0	0	2	-------	-------	174	29	29	1	0	0
New Hampshire	0	0	0	-------	3	-------	8	15	-------	0	0	0
Vermont	0	0	0	38	32	2	223	3	4	1	0	0
Massachusetts	13	3	3	-------	-------	-------	457	203	351	2	6	6
Rhode Island	0	0	0	-------	-------	-------	125	-------	20	0	0	0
Connecticut	0	2	1	1	15	8	226	60	155	0	2	2
MIDDLE ATLANTIC												
New York	30	21	16	[1] 9	[1] 12	[1] 12	151	745	745	10	17	25
New Jersey	2	6	2	6	19	19	120	156	165	7	6	7
Pennsylvania	13	19	11	2	4	2	598	1,047	1,553	8	19	18
EAST NORTH CENTRAL												
Ohio	29	33	13	1	40	14	395	69	136	3	9	11
Indiana	9	23	12	5	103	35	20	140	140	1	4	4
Illinois	5	6	10	2	8	14	25	668	371	0	13	13
Michigan [2]	11	12	8	-------	11	15	68	787	166	0	10	5
Wisconsin	2	2	0	32	214	84	107	63	241	0	3	3
WEST NORTH CENTRAL												
Minnesota	9	22	5	-------	2	2	50	12	21	2	7	4
Iowa	3	1	3	-------	-------	-------	9	32	75	1	2	1
Missouri	7	6	6	3	8	8	4	230	147	1	5	11
North Dakota	1	2	2	43	21	21	3	-------	7	0	0	0
South Dakota	2	2	1	-------	-------	-------	8	100	100	1	3	1
Nebraska	2	1	1	-------	1	6	-------	36	20	0	0	2
Kansas	4	6	6	7	35	14	7	390	278	0	1	1
SOUTH ATLANTIC												
Delaware	0	1	0	-------	-------	-------	1	12	12	0	1	0
Maryland [2]	6	15	6	2	20	20	13	73	73	2	6	6
District of Columbia	1	0	0	-------	3	2	26	11	18	0	1	2
Virginia	8	13	13	430	1,307	660	164	215	201	4	5	7
West Virginia	2	5	5	39	749	92	125	61	61	1	4	3
North Carolina	5	13	12	-------	-------	35	236	96	96	2	15	10
South Carolina	5	5	5	633	1,767	871	57	65	65	0	0	5
Georgia	4	3	2	28	98	117	112	37	40	3	0	2
Florida	9	8	6	10	8	8	9	32	32	1	3	3
EAST SOUTH CENTRAL												
Kentucky	13	9	7	12	213	10	3	320	115	2	7	7
Tennessee	11	15	6	23	178	127	13	126	114	0	9	6
Alabama	8	6	10	149	727	482	9	36	36	1	5	5
Mississippi [2]	2	2	3	-------	-------	-------	-------	-------	-------	1	7	7
WEST SOUTH CENTRAL												
Arkansas	10	7	8	53	438	426	81	37	91	0	2	3
Louisiana	9	3	3	9	1,317	24	38	4	21	4	4	3
Oklahoma	3	7	6	83	280	231	7	49	49	1	1	1
Texas	23	43	43	1,519	4,652	2,259	80	347	347	6	10	13
MOUNTAIN												
Montana	0	1	1	21	147	31	230	15	163	1	0	0
Idaho	2	1	1	17	54	2	5	132	8	0	0	0
Wyoming	0	4	0	3	-------	19	2	4	38	0	0	1
Colorado	3	6	6	48	126	93	34	100	220	1	0	0
New Mexico	3	1	2	6	1	2	29	5	7	0	1	0
Arizona	6	5	3	156	170	170	63	8	12	0	0	1
Utah [2]	0	0	0	12	909	6	8	95	35	0	0	1
Nevada	0	0	0	-------	-------	1	-------	7	7	0	0	0
PACIFIC												
Washington	2	10	3	-------	-------	3	23	308	149	2	3	5
Oregon	3	5	5	16	70	32	30	58	75	0	3	3
California	22	37	35	12	403	175	85	941	766	10	17	17
Total	302	392	323	3,432	14,255	5,667	4,261	7,997	13,444	80	211	219
5 weeks	1,579	2,116	1,723	20,342	130,522	22,592	19,056	28,282	49,545	424	1,120	1,172
Seasonal low week [3]	(27th) July 5–11			(30th) July 26–Aug. 1			(35th) Aug. 30–Sept. 5			(37th) Sept. 13–19		
Total since low	9,145	13,760	10,712	53,317	492,770	58,454	41,943	54,406	87,558	[4] 1,396	2,624	2,802

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Dates between which the approximate low week ends. The specific date will vary from year to year.
[4] Correction: Meningitis, Arkansas, week ended October 26, 1946, 4 cases (instead of 3).

Telegraphic morbidity reports from State health officers for the week ended Feb. 1, 1947, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever[5]		
	Week ended—		Median 1942-46	Week ended—		Median 1942-46	Week ended—		Median 1942-46	Week ended—		Median 1942-46
	Feb. 1, 1947	Feb. 2, 1946		Feb. 1, 1947	Feb. 2, 1946		Feb. 1, 1947	Feb. 2, 1946		Feb. 1, 1947	Feb. 2, 1946	
NEW ENGLAND												
Maine	1	0	0	40	38	38	0	0	0	0	0	0
New Hampshire	0	0	0	1	12	12	0	0	0	0	0	0
Vermont	2	0	0	10	12	12	0	0	0	0	0	0
Massachusetts	1	0	0	122	189	372	0	0	0	5	1	1
Rhode Island	0	0	0	14	14	16	0	0	0	0	0	0
Connecticut	0	0	0	71	33	85	0	0	0	0	1	0
MIDDLE ATLANTIC												
New York	8	2	2	343	375	445	0	0	0	4	3	3
New Jersey	1	0	0	132	129	130	0	0	0	0	1	1
Pennsylvania	1	0	1	187	296	309	0	0	0	2	1	4
EAST NORTH CENTRAL												
Ohio	1	2	0	402	329	329	2	0	0	2	2	2
Indiana	1	0	0	74	114	158	2	0	1	0	0	0
Illinois	3	2	1	158	145	260	0	1	1	1	1	2
Michigan[2]	4	0	0	148	133	174	0	0	0	0	2	2
Wisconsin	2	0	0	87	148	183	0	0	0	1	0	0
WEST NORTH CENTRAL												
Minnesota	0	0	1	42	49	92	0	0	0	0	0	0
Iowa	0	1	0	57	41	63	0	0	0	1	0	0
Missouri	3	1	1	43	92	110	0	0	0	0	1	1
North Dakota	0	0	0	10	11	30	0	0	0	0	0	0
South Dakota	0	0	0	1	23	23	0	0	0	0	0	0
Nebraska	1	0	0	31	45	45	1	0	1	0	1	0
Kansas	0	1	0	63	65	90	0	0	0	0	0	0
SOUTH ATLANTIC												
Delaware	0	0	0	15	5	8	0	0	0	0	0	0
Maryland[2]	2	0	0	23	59	90	0	0	0	0	1	1
District of Columbia	1	0	0	4	14	21	0	0	0	0	0	0
Virginia	1	0	0	27	94	50	0	0	0	1	0	1
West Virginia	1	0	0	38	24	54	0	0	0	0	0	0
North Carolina	1	2	1	26	65	65	0	0	0	1	3	1
South Carolina	0	0	0	14	17	9	0	0	0	1	2	1
Georgia	0	0	0	20	8	17	0	0	0	2	4	4
Florida	4	7	3	5	10	13	0	0	0	3	0	0
EAST SOUTH CENTRAL												
Kentucky	0	0	0	61	38	84	0	0	1	2	1	0
Tennessee	1	1	1	36	29	40	1	0	0	1	0	1
Alabama	1	0	0	13	13	13	0	0	1	0	0	1
Mississippi[2]	1	1	1	7	22	12	0	0	0	0	1	3
WEST SOUTH CENTRAL												
Arkansas	1	1	0	7	5	6	0	0	0	3	0	1
Louisiana	0	2	0	16	17	14	0	0	0	4	0	3
Oklahoma	1	0	0	4	28	25	0	0	0	5	0	0
Texas	2	2	2	39	86	86	0	4	2	2	1	3
MOUNTAIN												
Montana	0	3	0	10	7	14	0	1	0	0	0	0
Idaho	0	0	0	13	6	18	0	0	0	2	0	0
Wyoming	0	0	0	5	2	14	0	0	0	0	0	0
Colorado	1	0	0	40	26	52	0	0	0	0	0	0
New Mexico	0	0	0	9	15	5	0	0	0	0	2	1
Arizona	1	0	0	8	12	12	0	0	0	4	0	0
Utah[2]	0	0	0	21	50	66	0	0	0	0	0	0
Nevada	0	0	0	1	0	2	0	0	0	0	0	0
PACIFIC												
Washington	2	4	0	53	19	28	0	0	0	1	1	1
Oregon	0	0	0	27	21	21	0	0	0	4	0	0
California	8	6	5	127	231	231	0	0	0	1	6	5
Total	58	38	29	2,705	3,216	4,037	6	6	13	53	36	77
5 weeks	[6] 373	248	164	12,393	14,155	18,187	23	35	62	219	205	285
Seasonal low week[3]	(11th) Mar. 15-21			(32nd) Aug. 9-15			(35th) Aug. 30-Sept. 5			(11th) Mar. 15-21		
Total since low	[6]25,146	13,585	12,240	39,079	52,726	57,141	77	111	179	3,747	4,450	5,345

[2] Period ended earlier than Saturday.
[3] Dates between which the approximate low week ends. The specific date will vary from year to year.
[5] Including paratyphoid fever reported separately, as follows: Massachusetts 3 (salmonella infection); Georgia 1; Arkansas 2; Arizona 1.
[6] Corrections: Poliomyelitis, week ended January 4, Indiana 5 cases (instead of 4), Arkansas 0 (instead of 1); Maryland 1 September case deducted from total for 1946 and cumulative since low.

Telegraphic morbidity reports from State health officers for the week ended Feb. 1, 1947, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Whooping cough			Week ended Feb. 1, 1947							
	Week ended—		Median 1942–46	Dysentery			Encephalitis, infectious	Rocky Mt. spotted fever	Tularemia	Typhus fever, endemic	Undulant fever
	Feb. 1, 1947	Feb. 2, 1946		Amebic	Bacillary	Unspecified					
NEW ENGLAND											
Maine	8	18	22								
New Hampshire	2	2	2								1
Vermont	15	15	29								
Massachusetts	237	98	150		1						1
Rhode Island	11	19	24								
Connecticut	60	43	53								6
MIDDLE ATLANTIC											
New York	178	256	256	8			1				3
New Jersey	186	133	133	1							1
Pennsylvania	232	153	219	3							1
EAST NORTH CENTRAL											
Ohio	142	124	139	1					1		5
Indiana	29	16	29				1		1		2
Illinois	111	65	75	5					8		11
Michigan [2]	200	102	102	1							1
Wisconsin	159	67	134	1			1		1		3
WEST NORTH CENTRAL											
Minnesota	21	9	43	3							1
Iowa	25	4	30								10
Missouri	25	7	15						1		1
North Dakota			7								
South Dakota	1	1	1								
Nebraska	7	5	5	2							
Kansas	14	31	41				1		1		3
SOUTH ATLANTIC											
Delaware	16	7	3								
Maryland [2]	71	25	43			1				2	2
District of Columbia	3	2	6								
Virginia	79	52	65	1		46			2		2
West Virginia	15	12	43								
North Carolina	35	35	151						2	4	
South Carolina	45	51	57	1	7				1	2	1
Georgia	19	10	14	1	1				1	16	1
Florida	49	13	15	1	1	1				9	
EAST SOUTH CENTRAL											
Kentucky	51	24	26						1	1	
Tennessee	18	29	29						7	3	
Alabama	100	19	19							9	4
Mississippi [2]									3	1	5
WEST SOUTH CENTRAL											
Arkansas	21	12	17	2	3				3		
Louisiana	8	1	3	8	3				1	11	2
Oklahoma	4	27	10						2		1
Texas	210	141	144	18	326	325				10	6
MOUNTAIN											
Montana	3	6	10								
Idaho	4	11	9								
Wyoming	2		2								
Colorado	11	24	24								1
New Mexico	14	25	19		2						
Arizona	31	13	18			53					
Utah [2]	3	29	23								1
Nevada			2								
PACIFIC											
Washington	21	34	34								
Oregon	1	12	12	1			1				1
California	117	115	239	2	1		1			1	
Total	2,623	1,897	2,403	60	345	426	6	0	36	69	77
Same week, 1946	1,897			35	326	167	10	1	18	50	75
Median, 1942–46	2,403			23	184	56	10	0	18	50	[7] 80
5 weeks: 1947	12,123			185	2,160	1,253	32	1	258	271	419
1946	9,233			198	1,748	692	42	1	122	296	821
Median, 1942–46	11,388			117	1,199	270	42	1	122	296	[7] 338

[2] Period ended earlier than Saturday.
[7] 2-year average, 1945–46.

Anthrax: New York 1 case.
Leprosy: California 2 cases.

WEEKLY REPORTS FROM CITIES [1]

City reports for week ended Jan. 25, 1947

This table lists the reports from 88 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	1	------	0	39	0	1	0	5	0	0	------
New Hampshire:												
Concord	0	0	------	0	------	0	0	0	0	0	0	------
Vermont:												
Barre	0	0	------	0	3	0	0	0	0	0	0	1
Massachusetts:												
Boston	7	0	------	0	9	1	16	0	21	0	1	50
Fall River	0	0	------	0	2	0	2	0	0	0	0	3
Springfield	0	0	------	0	7	0	0	0	2	0	0	5
Worcester	0	0	------	0	1	0	13	0	0	0	1	16
Rhode Island												
Providence	2	0	------	0	30	0	6	0	8	0	0	10
Connecticut:												
Bridgeport	0	0	------	0	7	0	4	0	1	0	0	2
Hartford	0	0	------	0	1	0	2	0	6	0	0	------
New Haven	0	0	------	0	33	0	0	0	7	0	0	8
MIDDLE ATLANTIC												
New York:												
Buffalo	2	0	------	1	------	0	8	0	9	0	0	1
New York	19	1	6	0	54	3	65	2	111	0	2	65
Rochester	1	0	------	0	2	1	2	0	10	0	0	------
Syracuse	2	0	------	0	------	0	2	0	12	0	0	17
New Jersey:												
Camden	0	0	------	0	------	0	3	0	1	0	0	7
Newark	0	0	1	1	4	1	7	0	23	0	0	38
Trenton	0	0	1	1	18	0	2	0	3	0	0	1
Pennsylvania:												
Philadelphia	2	0	6	2	10	2	24	0	38	0	2	44
Pittsburgh	2	0	------	0	162	2	7	0	13	0	0	5
Reading	0	0	------	0	1	0	2	0	0	0	0	1
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	1	0	------	0	------	2	3	0	13	0	0	8
Cleveland	0	0	1	0	185	0	6	0	23	0	0	23
Columbus	2	0	------	0	1	0	6	0	15	0	0	5
Indiana:												
Fort Wayne	0	0	------	0	9	0	3	0	0	0	0	------
Indianapolis	1	0	------	1	------	0	3	0	24	0	0	24
South Bend	0	0	------	0	------	0	0	0	3	0	0	3
Terre Haute	0	0	------	0	------	0	1	0	1	0	1	------
Illinois:												
Chicago	1	0	1	0	9	1	24	1	55	0	0	51
Michigan:												
Detroit	4	0	------	0	5	1	8	0	35	0	0	67
Flint	0	0	------	0	------	0	5	0	2	0	0	3
Grand Rapids	0	0	------	0	1	0	1	0	1	0	0	1
Wisconsin:												
Kenosha	0	0	------	0	------	0	0	0	2	0	0	------
Milwaukee	0	0	------	0	13	1	2	0	27	0	0	53
Racine	0	0	------	0	------	0	0	2	3	0	0	4
Superior	0	0	------	0	1	0	1	0	0	0	0	------
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0	------	0	------	0	0	0	1	0	0	1
Minneapolis	1	0	------	2	2	0	1	0	13	0	0	1
St. Paul	1	0	------	0	5	0	4	0	7	0	0	12
Missouri:												
Kansas City	2	0	------	0	3	0	7	0	9	0	0	21
St. Joseph	0	0	------	0	------	0	0	0	2	0	0	2
St. Louis	2	0	2	0	2	4	7	1	9	0	0	8

[1] In some instances the figures include nonresident cases.

City reports for week ended Jan. 25, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
Nebraska:												
Omaha	1	0	------	0	2	0	4	1	2	0	0	------
Kansas:												
Topeka	0	0	------	0	------	0	2	0	0	0	0	2
Wichita	0	1	------	0	1	0	1	0	4	0	0	1
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0	------	0	------	0	3	0	4	0	0	2
Maryland:												
Baltimore	5	0	1	0	6	0	8	0	8	0	0	56
Cumberland	0	0	------	0	7	0	0	0	0	0	0	------
Frederick	0	0	------	0	------	0	0	0	0	0	0	------
District of Columbia:												
Washington	0	0	------	0	14	0	4	0	15	0	0	3
Virginia:												
Lynchburg	0	0	------	0	------	0	0	0	0	0	0	------
Richmond	0	0	------	0	37	0	2	0	0	0	0	------
Roanoke	1	0	------	0	------	0	0	0	5	0	0	------
West Virginia:												
Charleston	0	0	------	0	------	0	0	0	2	0	0	------
Wheeling	0	0	------	0	1	0	0	0	1	0	0	3
North Carolina:												
Raleigh	0	0	------	0	4	0	1	0	0	0	0	9
Wilmington	0	0	------	0	4	0	2	0	0	0	0	------
Winston-Salem	0	0	------	0	25	0	2	0	2	0	0	4
South Carolina:												
Charleston	0	0	11	0	4	0	3	0	1	0	0	------
Georgia:												
Atlanta	0	0	------	0	10	0	1	0	8	0	0	1
Brunswick	0	0	------	0	1	0	0	0	0	0	0	------
Savannah	0	0	1	1	39	0	1	0	0	0	0	------
Florida:												
Tampa	4	0	------	0	3	0	2	1	2	0	1	1
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	2	1	------	0	1	0	14	0	1	0	0	8
Nashville	0	0	------	1	------	0	3	0	3	0	0	------
Alabama:												
Birmingham	1	0	7	1	8	0	2	0	3	0	0	------
Mobile	0	0	3	1	------	0	2	0	0	0	0	------
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	1	0	------	0	2	0	2	0	0	0	0	2
Louisiana:												
New Orleans	1	0	1	1	2	2	6	0	4	0	1	2
Shreveport	0	0	------	0	------	0	10	0	0	0	0	------
Texas:												
Dallas	0	0	1	1	1	0	2	0	2	0	0	1
Galveston	0	0	------	0	------	0	0	0	0	0	0	------
Houston	0	0	------	0	------	0	5	1	1	0	0	------
San Antonio	3	0	------	0	------	1	9	0	1	0	2	1
MOUNTAIN												
Montana:												
Billings	0	0	------	0	------	0	1	0	2	0	0	2
Great Falls	0	0	------	0	74	0	3	0	0	0	0	------
Helena	0	0	------	0	6	0	0	0	0	0	0	------
Missoula	0	0	------	0	------	0	0	0	1	0	0	7
Idaho:												
Boise	0	0	------	0	------	0	3	0	0	0	0	1
Colorado:												
Denver	2	0	5	0	5	0	12	0	25	0	0	5
Pueblo	0	0	------	0	------	0	1	0	0	0	0	------
Utah:												
Salt Lake City	0	0	------	0	------	0	1	0	7	0	0	------

City reports for week ended Jan. 25, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
PACIFIC												
Washington:												
Seattle	0	0	------	0	5	1	4	0	7	0	1	5
Spokane	1	0	------	0	2	0	3	0	7	0	0	2
Tacoma	0	0	------	0	3	0	0	0	6	0	0	------
California:												
Los Angeles	8	0	9	3	4	2	8	11	13	0	0	25
Sacramento	1	0	------	0	------	0	2	0	2	0	0	2
San Francisco	1	0	1	1	4	0	3	1	10	0	0	2
Total	84	4	58	18	894	25	380	21	664	0	12	714
Corresponding week, 1946	120	------	359	50	2,672	------	463	------	852	1	8	549
Average 1942-46	76	------	506	[2] 85	[3] 2,799	------	[2] 544	------	1,311	1	12	772

[2] 3-year average, 1944-46.
[3] 5-year median, 1942-46.

Dysentery, amebic.—Cases: New York 2; Chicago 1; Detroit 1; Los Angeles 1.
Dysentery, bacillary.—Cases: Worcester 1; Los Angeles 3.
Dysentery, unspecified.—Cases: San Antonio 3.
Tularemia.—Cases: St. Louis 1; Houston 1.
Typhus fever, endemic.—Cases: New York 1; Baltimore 2; Wilmington, N. C., 1; Mobile 1; New Orleans 2.

Rates (annual basis) per 100,000 population, by geographic groups, for the 88 cities in the preceding table (estimated population, 1943, 34,293,900)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza Case rates	Influenza Death rates	Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Tyhpoid and paratyphoid fever case rates	Whooping cough case rates
New England	23.5	2.6	0.0	0.0	345	2.6	115.0	0.0	131	0.0	5.2	204
Middle Atlantic	13.0	0.5	6.5	2.3	116	4.2	56.5	0.9	102	0.0	1.9	83
East North Central	5.5	0.0	1.2	0.6	137	3.1	38.6	1.8	125	0.0	0.6	148
West North Central	14.1	2.0	4.0	4.0	30	8.0	52.3	4.0	95	0.0	0.0	86
South Atlantic	16.3	0.0	21.2	1.6	253	0.0	47.4	1.6	78	0.0	1.6	120
East South Central	17.7	5.9	59.0	17.7	53	0.0	123.9	0.0	41	0.0	0.0	47
West South Central	14.3	0.0	5.7	5.7	14	8.6	97.0	2.9	23	0.0	8.6	32
Mountain	15.9	0.0	39.7	0.0	675	0.0	166.8	0.0	278	0.0	0.0	119
Pacific	17.4	0.0	15.8	6.3	28	4.7	31.6	10.0	71	0.0	1.6	57
Total	12.8	0.6	8.8	2.7	130	3.8	57.9	3.2	101	0.0	1.8	109

TERRITORIES AND POSSESSIONS

Panama Canal Zone

Notifiable diseases—December 1946.—During the month of December 1946, cases of certain notifiable diseases were reported in the Panama Canal Zone and terminal cities as follows:

Disease	Residence [1]									
	Panama City		Colon		Canal Zone		Outside the Zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox	14		5		12		1		32	
Diphtheria	21						9		30	
Dysentery:										
Amebic	2				1		8		11	
Bacillary	2				5		2		9	
Leprosy							1		1	
Malaria [2]	7		2		27		42	5	78	5
Measles	6		10	1	25		8		49	1
Meningitis, meningococcus	1						1		2	
Mumps					6				6	
Paratyphoid fever					1				1	
Pneumonia		4		5	26	6		7	[3] 26	22
Tuberculosis		23		12	3	2		5	[3] 3	42
Whooping cough					3				[3] 3	

[1] If place of infection is known, cases are so listed instead of by residence.
[2] 4 recurrent cases.
[3] In the Canal Zone only.

* * *

DEATHS DURING WEEK ENDED JAN. 25, 1947

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Jan. 25, 1947	Corresponding week, 1946
Data for 93 large cities of the United States:		
Total deaths	9,958	10,157
Median for 3 prior years	10,068	
Total deaths, first 4 weeks of year	40,765	44,156
Deaths under 1 year of age	848	507
Median for 3 prior years	622	
Deaths under 1 year of age, first 4 weeks of year	3,371	2,428
Data from industrial insurance companies:		
Policies in force	67,208,392	67,142,890
Number of death claims	13,844	17,211
Death claims per 1,000 policies in force, annual rate	10.7	13.4
Death claims per 1,000 policies, first 4 weeks of year, annual rate	9.8	11.7

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended January 11, 1947.—During the week ended January 11, 1947, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox	1	12	1	270	703	46	45	68	128	1,274
Diphtheria		1	1	32	6	4		3	3	50
Dysentery, amebic					11					11
German measles				4	14		3	10	9	40
Influenza		8			29	2	2		4	45
Measles		201	3	123	64	120	264	360	558	1,693
Meningitis, meningococcus		1			1	1				3
Mumps		3		86	524	22	179	26	310	1,150
Poliomyelitis		1		1						2
Scarlet fever		2	9	36	114	6	1	11	17	196
Tuberculosis (all forms)			15	43	40	7	5	9	46	165
Typhoid and paratyphoid fever				11	2		1		3	17
Undulant fever				1						1
Venereal diseases:										
Gonorrhea		20	31	98	122	51	47	57	92	518
Syphilis		9	11	71	71	14	8	9	31	224
Other forms									3	3
Whooping cough		5	68	20	140	16	6	7	10	272

JAMAICA

Notifiable diseases—4 weeks ended January 11, 1947.—During the 4 weeks ended January 11, 1947, cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Cerebrospinal meningitis	1		Puerperal sepsis		2
Chickenpox	3	2	Tuberculosis (pulmonary)	23	41
Diphtheria	1	3	Typhoid fever	6	65
Dysentery, unspecified	2	2	Typhus fever (murine)	2	1
Erysipelas	1	4			

JAPAN

Notifiable diseases—2 weeks ended December 28, 1946, and total number of cases reported for the year to date.—During the 2 weeks ended December 28, 1946, and for the year to date, cases of certain notifiable diseases were reported in Japan as follows:

Disease	2 weeks ended Dec. 28, 1946	Total number of cases reported for the year to date	Disease	2 weeks ended Dec. 28, 1946	Total number of cases reported for the year to date
Cholera	16	1,229	Paratyphoid fever	240	9,090
Diphtheria	1,748	49,166	Scarlet fever	103	2,209
Dysentery, unspecified	224	87,737	Smallpox	32	17,800
Encephalitis, Japanese "B"	2	[1] 176	Syphilis	3,745	74,009
Gonorrhea	5,709	128,845	Typhoid fever	904	44,421
Malaria	366	[1] 26,207	Typhus fever	116	31,141
Meningitis, epidemic	39	1,468			

[1] For the period June 2, 1946, to date.

NEW ZEALAND

Notifiable diseases—4 weeks ended December 28, 1946.—During the 4 weeks ended December 28, 1946, certain notifiable diseases were reported in New Zealand as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Cerebrospinal meningitis	4	1	Ophthalmia neonatorum	1	
Diphtheria	63	2	Puerperal fever	4	
Dysentery:			Scarlet fever	80	
Amebic	3		Trachoma	1	
Bacillary	5		Tuberculosis (all forms)	154	40
Erysipelas	14		Typhoid fever	9	1
Food poisoning	10		Undulant fever	3	
Malaria	2				

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-named diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday of each month.

Smallpox

Paraguay.—For the month of November 1946, 82 cases of smallpox (alastrim) were reported in Paraguay, including 64 cases unconfirmed in P. J. Caballero, 11 cases in Paraguari, and 6 cases in San Cosme.

Typhus Fever

Colombia.—For the month of December 1946, 288 cases of typhus fever with 14 deaths were reported in Colombia, including 206 cases with 13 deaths reported in Cundinamarca Department.

Peru.—For the month of November 1946, 104 cases of typhus fever were reported in Peru.

Yellow Fever

Colombia.—Yellow fever has been reported in Colombia as follows: Antioquia Department—Remedios, October 19, 1946, 1 death; Santander Department—Lebrija, January 7, 1947, 1 death, Rionegro, December 22, 1946, 1 death, Simacota, December 12, 1946, 1 death, San Vincente de Chucuri, December 9, 1946, 1 death.

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

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Public Health Reports

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Public Health Reports

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A COMPARATIVE STUDY OF LIVE AND KILLED VACCINES IN EXPERIMENTAL TUBERCULOSIS

A PRELIMINARY NOTE[1]

By B. J. OLSON, *Surgeon,* KARL HABEL, *Surgeon,* and WILLARD R. PIGGOTT, *Bacteriologist, United States Public Health Service*

The recent development of an apparatus for the ultraviolet irradiation of mass quantities of bacteria by Oppenheimer and Levinson (*1*) offered an opportunity for studies of ultraviolet light-killed vaccines in comparison with variously prepared vaccines, including BCG, in experimental tuberculosis. This report presents the results secured with vaccines from one virulent strain of human-type tubercle bacilli and with BCG.

STRAINS OF ORGANISMS

A strain of BCG, R. L. 173, obtained from the Bureau of the Laboratories, New York City Department of Health in September 1943, has been carried in this laboratory on an inspissated egg medium similar to that described by Frimodt-Möller[2] (*2*). The strain of virulent tubercle bacilli, 199–RB (*Mycobacterium tuberculosis hominis*), was isolated from a patient in Tennessee. This strain was carried on the same media as the BCG strain.

PREPARATION OF VACCINE

Cultures of the organisms were grown at 37° C. on freshly prepared egg slants and were harvested after 12 to 15 days of incubation. The growth was removed, weighed, and then ground for 3 hours in a ball mill to ensure the preparation of a uniform suspension. The concentration of the final suspension was adjusted to 1 mg. per cubic centimeter.

EXPOSURE TO ULTRAVIOLET LIGHT

The exposure time to ultraviolet light varied from 1.23 seconds to 1.70 seconds per organism. This exposure represents an excess of

[1] From the Division of Infectious Diseases, National Institute of Health.

[2] No malachite green was added.

that necessary to kill; for example, BCG was killed by as little as 0.06 second per organism. It was felt in these initial experiments that definite killing was the primary consideration, although it is suspected that such severe treatment is not conducive to the retention of maximum antigenicity. Proof that irradiated organisms were killed was demonstrated in two ways. Four-tenths of a cubic centimeter of the undiluted irradiated suspension was seeded on each of 10 tubes of the above-mentioned egg media. An additional 10 tubes were seeded with 0.2 cc. of the same suspension. A total of 6 cc. of the undiluted vaccine, therefore, was cultured. All cultures were observed for a minimum of 180 days before being discarded; in no case was growth observed. Each of seven guinea pigs was injected intraperitoneally with 5 cc. of irradiated vaccine. No evidence of tuberculosis was found at autopsy in these animals after at least 2 months of observation.

The live BCG vaccine employed was prepared on each day of vaccination in the same manner as described, but it was not irradiated.

Heat-killed vaccines of each strain were prepared by heating comparable suspensions at 80° C. for 1 hour.

The shortest period of storage of ultraviolet-irradiated vaccine before being used in a test was 112 days at 10° C.

METHOD OF VACCINATION

Vaccinated animals: Irradiated vaccines.—Group A, 59 guinea pigs. Each guinea pig received 5 cc. of irradiated vaccine, 199–RB, intraperitoneally at weekly intervals (March 13, 20, and 27, 1946).

Vaccinated animals: Live vaccines.—Group B, 48 guinea pigs; each received 5 cc. of live BCG vaccine on the same dates as Group A.

Group C, 59 guinea pigs; each received only a single dose of 5 cc. of live BCG vaccine intraperitoneally on March 20, 1946.

Control group.—Group D and Group E; each group of 60 normal, nonvaccinated guinea pigs was given the same challenge dose of virulent tubercle bacilli as the vaccinated groups.

Challenge with virulent tubercle bacilli.—On April 17, 1946, each guinea pig in the above groups was challenged with 1 mg. of a suspension of a 15-day-old culture (199–RB) intraperitoneally. All the guinea pigs received the same treatment and were kept in the same room, five guinea pigs per cage. No animal was sacrificed, and all were observed up to time of death and autopsied.

RESULTS

Results are summarized in the accompanying chart. This chart gives the death curve (accumulated mortality by days since challenge)

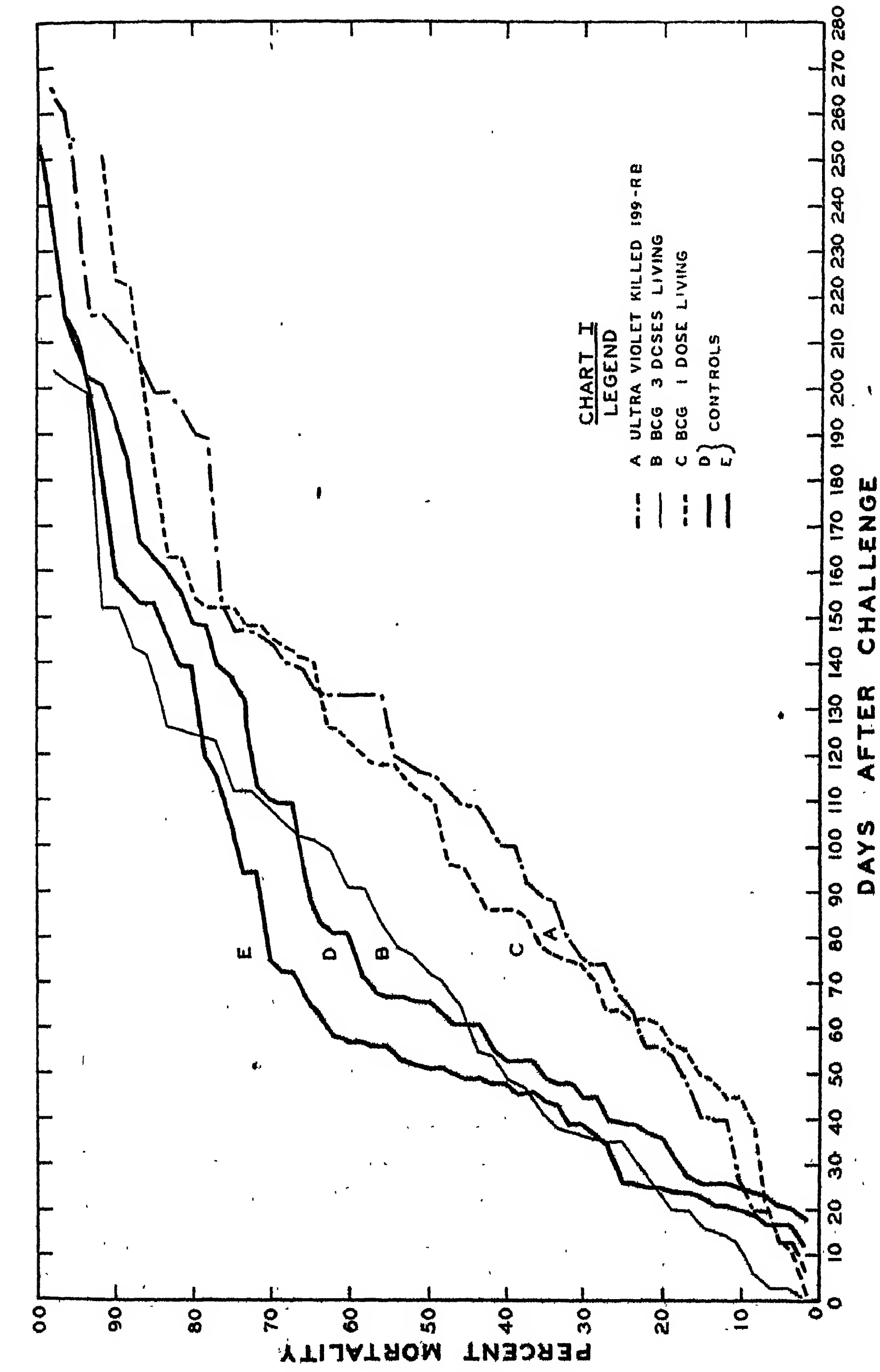
CHART I
LEGEND
A ULTRA VIOLET KILLED 199-RB
B BCG 3 DOSES LIVING
C BCG 1 DOSE LIVING
D } CONTROLS
E }
A
B
C
D
E
DAYS AFTER CHALLENGE
PERCENT MORTALITY
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280
10 20 30 40 50 60 70 80 90 100

for each of the five groups of guinea pigs to date (January 16, 1947). The effectiveness of each of the different vaccines is evaluated on the basis of ability to prolong the survival time over that of the control guinea pigs. It will be noted that no vaccine gave complete protection against the massive challenge dose of tubercle bacilli employed. Three doses of live BCG (Group B) gave slight, if any, protection. The single dose of live BCG (Group C) and three doses of ultraviolet-killed virulent tubercle bacilli (Group A, 199–RB) gave the most protection and were about equally effective.

Although not shown on the chart, the results with heat-killed and ultraviolet-killed BCG were essentially the same as results obtained by the use of three doses of live BCG, that is, relatively ineffective. Heat-killed 199–RB was also ineffective in immunizing animals.

CONCLUSION

A killed vaccine prepared by ultraviolet irradiation of a virulent tubercle bacilli (strain 199–RB) with the Oppenheimer-Levinson apparatus and administered in three doses was equal in effectiveness to a single dose of live BCG and was more effective than three doses of the latter against a massive dose of virulent tubercle bacilli (199–RB) in guinea pigs. The ultraviolet-killed bacilli of the virulent strain made a more effective vaccine against this strain than the same virulent strain heat-killed or ultraviolet-killed BCG.

Inasmuch as in this initial work the effectiveness of the ultraviolet-killed virulent strain was demonstrated by challenge with its homologous strain, further work is in progress to test its effectiveness against heterologous virulent strains. The comparative antigenicity of other virulent strains is also under study.

REFERENCES

(1) Oppenheimer F., and Levinson, S. O.: A new method for the production of potent inactivated vaccine with ultraviolet irradiation. I. Principles, technique, and apparatus. Publication withheld by Committee on Medical Research, Office of Scientific Research and Development.

(2) Frimödt-Möller, J.: Dissociation of tubercle bacilli. London, H. K. Lewis and Co., Ltd. (1939), page 44.

CONTROL OF ANOPHELINE MOSQUITO LARVAE BY USE OF DDT-OIL MISTS [1]

By Frederick F. Ferguson, *Senior Assistant Sanitarian (R)*, Earl H. Arnold, *Senior Assistant Engineer (R)*, and William M. Upholt, *Assistant Sanitarian (R), United States Public Health Service*

The commonly used methods of controlling *Anopheles quadrimaculatus* larvae by sprays has involved the application of from 15

[1] From Communicable Disease Center, Technical Development Division (Savannah, Ga.), States Relations Division.

to 20 gallons of larvicide per acre of water surface. Among the first adaptations of DDT to the control of mosquito larvae was the application of the same total quantity of material, consisting of a quick-breaking DDT-oil-water emulsion using the same types of equipment and methods of treatment as formerly. Although this method of treatment is highly effective (*1*), it is also relatively toxic to aquatic wildlife, and no manpower savings are realized with its use. Since only minute quantities of DDT-fuel-oil solutions are required to kill anopheline larvae, equipment and techniques for uniformly distributing small dosages were developed (*2*). The present paper details the results of larvicidal tests made with various solutions and dosages of DDT in order to determine the most effective procedures for the hand distribution of oil mist sprays.

Experimental plots were selected from the variety of mosquito larval habitats found near Savannah, Ga. These were selected primarily from the standpoint of permanency, size, type of vegetative cover, and density of larval populations. Sampling was done by means of dippers, and for the most part, an attempt was made to determine the larval instars in the field. A majority of the studies entailed pretreatment sampling, with one-day, two-day, three-day, five-day, seven-day, ten-day, and fourteen-day posttreatment larval counts. Untreated check plots were used when possible, and studies on the larvicidal effects of the solvent alone were made. Gross observations were made on the condition of other aquatic organisms at each visit to an experimental plot.

No. 2 fuel oil was selected as a solvent, since former work (*1, 3, 4, 5,* and *6*) had indicated it to be satisfactory with reference to its DDT dissolving capacity, cost, availability, and larviciding results obtained. The spreading properties of the solvent were enhanced by the addition of a small quantity (0.5 percent) of B-1956 [2] to the larviciding formula. Other commercially available materials, such as Emulphor AG, Oil Soluble,[3] may also be satisfactory as spreading agents. In general, the effectiveness of the DDT-oil mists was improved by the addition of spreading agents. Observations indicated that there is considerable variation in the spreading properties of the various fuel oils, some of which spread very poorly when applied to the water surface. The addition of small amounts of suitable spreading agents had the effect of improving the spreading properties and of minimizing the importance of the variation.

[2] B-1956 is made by Rohm and Haas Company, Philadelphia, Pa.
[3] Emulphor AG, Oil Soluble is made by General Dyestuffs Corp., New York, N. Y.

EQUIPMENT

The application of small total quantities of DDT larvicide with air-pressure sprayers fitted with mist nozzles may be considered to be merely an adaptation of airplane-dispersal methods to hand larviciding. The aforementioned DDT formula may be applied at the rate of one gallon per acre and be readily dispersed over the breeding area with the equipment to be described.

Agricultural sprayers of the air-pressure type were used in the study. These sprayers are fitted with a hand pump for developing pressure in the tank and vary in capacity from one and one-half to four gallons. The larger sprayer has the greater capacity and, when charged with a gallon of larvicide, requires considerably less frequent repumping in order to maintain the optimum operating pressure; the smaller sizes will be found convenient for use in areas where obstructions such as trees or other vegetation are present in the watered areas.

The sprayers are best fitted with pressure gages recording from 0 to 100 p. s. i., and with a three- to four-foot-long oil-resistant hose. A wand 2 to 3 feet in length is fitted with an atomizing nozzle of small capacity which produces a fine mist spray.[4] The nozzle used is of very simple construction. It has no moving parts, and is constructed of bronze, with the exception of a gauze screen in the body to prevent clogging. Since the screen openings are smaller than the flow passages, they are the only place which usually requires cleaning, although it may occasionally be necessary to clean flow passages and the orifice plate. Cleaning is easily accomplished by unscrewing the body from the base and disassembling the component parts. Since the internal parts can be fitted together only in the proper manner, correct reassembly is assured. The sprayer is operated at a pressure range of from 30 to 50 p. s. i., the average discharge over this range being approximately 3.0 gallons per hour. Determination of particle size by measuring droplet sizes on carbon-coated slides shows that the mist spray produces particles ranging from 70 to 220 microns. Tests performed showed the mass median diameter of droplets produced over a 30- to 40-foot swath to be in the range of 100 to 125 microns, the tests being made with a 2½-m. p. h. wind blowing. A shoulder strap on the sprayer permits the operator to carry the equipment with a minimum of discomfort. The wand is directed with one hand, the other remaining free.

---

[4] Nozzle 1H41 manufactured by the Marley Company, Inc., ¼LN 2.55 manufactured by the Spraying Systems Company, and Monarch 5 manufactured by the Monarch Manufacturing Works have been used experimentally, and found to be satisfactory.

OPERATIONS

In operation, the sprayer is usually charged with 1 gallon of the larvicide. This quantity has been found convenient since it will treat approximately an acre of breeding area, does not overload the operator, and with the larger volume of air does not require as frequent repumping. The sprayer is pumped to a pressure of 50 pounds and is not allowed to drop below a pressure of 30 pounds. The vaporous oil mist discharged by the nozzle is windborne for considerable distances. A swath width of 30 feet was selected since satisfactory results were obtained under most conditions encountered (i. e., winds up to 5 m. p. h.). With low wind velocities, recovery beyond 30 feet is low, while with increased wind velocities the effective swath width may be 40 or 50 feet. In treating watered areas, the operator moves at a slow pace (approximately 75 feet per minute) through the area, holding the nozzle at a height compatible with the particular wind velocity. While the mist is visible to some extent, both in the air and as it strikes the water surface, it is advisable to ignore it as a swath-measurement device. The oil film formed is very slight, thus little marker is present on the surface. Hence, it is desirable to mark swaths, or to so instruct the operator in the practice of mentally demarking them that with practice the swath width may be reasonably approximated. As described elsewhere (*2*), unskilled labor may be taught this type of larviciding within a very short period of time.

Mixing of the larvicide is very readily and simply done by adding 2½ pounds of technical DDT, and 1 quart of B–1956 to 50 gallons of clean No. 2 fuel oil. The materials may be introduced through the bung of the oil drum, and agitated by tipping or rolling on the ground. The drum should be allowed to stand at least 24 hours before use, and should be agitated prior to withdrawing any larvicide for transporting to the field. Precautionary measures to avoid contamination of the larvicide with debris during mixing or handling should be observed, in order to eliminate unnecessary clogging of the nozzle in the field.

EXPERIMENTAL FIELD RESULTS

In the course of the studies performed, applications of DDT in fuel oil were made at the rate of 2, 1, and ½ gallons of solvent per acre. In each case, the amount of DDT varied so as to produce final applications ranging from 0.1 to 0.025 pounds of DDT per acre. Table 1 presents the results of applications of small quantities of DDT-oil larvicides applied with mist sprayers.

TABLE 1.—*Mortality of anopheline larvae obtained with DDT-fuel oil-B-1956 solutions, applied with air-pressure hand sprayers, fitted with "atomizing" nozzles*

Gallons of No. 2 fuel oil per acre	Number of tests	DDT dosage per acre	Larval mortality (percent) and time after treatments (days)			
			1 day	2 days	3 days	5 days
2	5	0.1	86	95	------	------
2	3	.05	98	99	94	------
1	17	.1	94	95	87	40
1	7	.05	88	94	93	66
1	2	.025	96	92	94	------
½	9	.1	95	94	96	21
½	5	.05	93	87	96	22
½	2	.025	98	100	------	------

These data indicate a high initial kill of larvae with all designated dosages of DDT in the varying quantities of solvent. Reinfestation, as shown by an increase in first instar populations, was generally in evidence by the third day when favorable weather conditions exist. While the population continues to build up, 10 to 12 days may elapse before many fourth instar larvae are present. DDT was equally effective against all larval instars, but it seemed to have little effect on pupae.

Table 2 presents a comparison of the effectiveness of two types of spray distribution under otherwise comparable conditions. A knapsack sprayer was used to apply the larvicide at the rate of 15 gallons per acre. This type of application was used for the dispersal of various DDT formulas as previously reported (*1*), and proved to be an effective method of distribution, although no manpower savings were

TABLE 2.—*Mortality of anopheline larvae obtained with treatments at the rate of 15 gallons per acre as compared to mortalities obtained with treatments at the rate of 1 gallon per acre. In all cases the DDT application was at the rate of 0.1 pound per acre*

Material and rate	Larval mortality (percent) and time after treatments (days)		
	1 day	2 days	3 days
Emulsions:			
Commercial product with DDT:			
15 gal./acre	93	96	------
1 gal./acre	92	------	100
DDT-xylene-Triton X-100 [1]-water:			
15 gal./acre	100	100	------
1 gal./acre	94	------	97
Suspensions:			
DDT-ethyl-alcohol-water:			
15 gal./acre	99	99	------
DDT-ethyl-alcohol-water:			
1 gal./acre	100	------	100
Surface applications:			
Fuel oil-DDT-water:			
15 gal./acre	96	99	------
Fuel oil-DDT:			
1 gal./acre	99	------	100

[1] Triton X-100 is an emulsifier produced by the Rohm and Haas Company, Philadelphia, Pa.

realized. The treatments at the rate of 1 gallon per acre were made with the mist sprayers. As will be noted in the table, no significant difference in effectiveness was indicated. Since the same total quantity of DDT and solvent was used in each case, the distribution of the toxic principle was apparently equally effective.

The experimental application of larvicides at low rates with the mist sprayer has proved effective for applying DDT emulsion or solution formulas. A companion paper (*2*) presents the results of studies made on areas treated with DDT solutions applied with mist sprayers as compared to similar areas treated with DDT dusts and paris-green dusts. Data on man-hours requirements showed that the mist-spray applications required 1.7 man-hours per acre larvicided, as compared to 3.1 for paris green, and 3.7 for DDT dust. The cost of larvicide per acre according to late season prices was as follows: DDT-oil solution \$0.15–\$0.20, DDT dust \$0.36, and paris-green dust \$0.25, showing a substantial savings in material costs in favor of the DDT-oil applications. The mist-spray larvicide produced considerably better larval kills than did the dusts, when all instars were considered separately.

Parallel studies performed on the effect of DDT on fish and associated fish-food organisms (*7*) indicated that routine applications of DDT at the rate of 0.1 pound per acre may produce detrimental effects on the fish and that applications in the range of 0.05 pound per acre may generally be used with reasonable safety. Since mortalities of mosquito larvae obtained with DDT applications in the range of 0.05 pound per acre were not significantly different than those obtained with 0.1 pound, the lower application rate was selected as a recommendation for general operational use by Malaria Control in War Areas, the recommended formula being 0.625 percent DDT, and 0.5 percent B-1956, in No. 2 fuel oil, with an application of 1 gallon of solution per acre.

SUMMARY

1. Dispersions of mist sprays of DDT-fuel-oil solutions have been shown to be a practical adaptation of this insecticide to the control of *Anopheles quadrimaculatus* larvae.

2. Since the material is equally effective against all larval instars, an extension of the larviciding interval from 2 to 3 days may be expected over that in use with paris-green dusts.

3. For routine treatments throughout the season, treatment applications of no more than 0.05 pound DDT per acre are recommended where fish life is of importance.

4. Mist-spray DDT-oil larvicides may be distributed by means of light-weight air-pressure sprayers. This results in less labor fatigue, and in the more effective use of manpower.

5. On the basis of current prices, savings in material costs as well as labor can be anticipated by the substitution of DDT-oil mist sprays for other types of larvicides.

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THE INACTIVATION OF DDT USED IN ANOPHELINE MOSQUITO LARVICIDES [1]

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INTRODUCTION

One of the most outstanding characteristics of DDT used as an insecticide is its persistence. The residual effectiveness of DDT applied to certain wall surfaces for the control of adult mosquitoes is measured in terms of months (*1*). When used in artificial containers for the control of larvae of *Aedes aegypti* (L), DDT may remain effective for a period of months (*2*). On the other hand, when DDT is used for the control of anopheline larvae at dosages that are adequate for high initial mortality and reasonably safe to other aquatic forms of wildlife, no residual toxicity is evident 1 to 2 weeks after application. Efforts to extend the larviciding interval by increasing the dosage of DDT without killing fish, or by changing the type of application, have been unsuccessful (*3*). Even a rather small increase in the period of effectiveness of DDT as an anopheline larvicide would be most valuable, because it would permit fewer applications for control during the season, thus saving greatly on labor as well as

[1] From Communicable Disease Center, Technical Development Division (Savannah, Ga.), States Relations Division.

[2] The author wishes to express his appreciation to Mrs. C. F. Stierli, Junior Entomologist, for valuable aid in conducting the experiments described herein.

materials. Therefore, it seemed worthwhile to devote some effort to determining the factors in anopheline-breeding areas that inactivate the DDT, hoping that the results might suggest a method of overcoming these factors and thus of obtaining a longer residual effectiveness.

Preliminary studies (3) have indicated that the presence of mud containing at least some organic matter is an important factor in the inactivation of the DDT. By adding 100 gm. of bottom mud to 250 or 300 ml. of laboratory preparations containing 0.25 p. p. m. of DDT, the toxicity to insectary-reared, fourth-instar larvae of *A. quadrimaculatus* (Say) was reduced to 13-percent mortality in a 24-hour exposure period within 5 days after preparation, whereas similar preparations without the bottom mud were still killing 100 percent of the larvae added thereto 10 days and longer after preparation.

It is not to be assumed from this experiment that mud is entirely responsible for the inactivation of DDT in nature. Undoubtedly other factors also play a role. It has been shown (3) that the effectiveness of DDT as a larvicidal spray is restricted by the distribution of the solvent. This is to be expected, inasmuch as DDT does not dissolve in water in sufficient quantities to kill larvae of *A. quadrimaculatus*. As a result any factor, such as wind and wave action or the precipitation of a suspension, which reduces the distribution of the DDT, will doubtless reduce its effectiveness. That such factors are important can be shown by applying a drop of No. 2 fuel oil, containing 1.25-percent DDT, to the clean surface of water in a crystallizing dish. Under proper conditions, the oil spreads to form a uniform film covering the entire surface of the water, but after a short time breaks up into a number of lenses separated by apparently clean areas. These areas actually are covered by an invisible film, as indicated by the fact that an additional drop placed in one of these apparently clean areas fails to spread. If, now, a tube is placed down through one of these clear areas, care being taken to exclude all portions of lenses, larvae confined in such a tube are not killed, even though larvae allowed to swim free in the crystallizing dish are killed very rapidly. Similarly, if wind or wave action in the field were to drive all of the DDT preparation to one side of the pond, no residuum could be expected in those areas free of DDT.

That wind and wave action are not alone responsible for the loss of effectiveness in the field should be apparent from the fact that even when the DDT is applied as a tight emulsion or as a suspension prepared by diluting an alcoholic solution (95-percent ethyl alcohol) with water, breeding occurs within essentially the same period following treatment (3). In such cases precipitation of the DDT could

logically remove it from the surface of the pond where anopheline larvae feed. However, a similar quantity of DDT, dried onto a microscope slide and then placed in a beaker of water, showed high toxicity to insectary-reared larvae. Again, glassware that had contained a considerable amount of DDT was emptied out, dried, and thoroughly rinsed in tap water, after which it continued to show toxicity. However, bottom-feeding larvae, such as some of the culicines, can be found living in ponds treated with an alcoholic suspension of DDT about as soon as anopheline larvae.

There are probably other factors that tend to reduce the effectiveness of DDT even in the absence of mud. A suspension of 1 part DDT in 10 to 50 million parts of water will kill 100 percent of the larvae when it is freshly prepared, but such concentrations lose their effectiveness, even in the absence of mud, over a period of 1 to 2 weeks. It has been observed that there is a change in the slope of the time-mortality curve as such preparations age. Thus, a freshly prepared suspension of one part DDT in 10 million parts of water will kill 100 percent of a reasonably sized sample of larvae within several hours. During the second 24 hours, it may be even more rapid. After 4 or 5 days, the rate of mortality may be quite slow, and by the time a week has elapsed, a 48-hour exposure may fail to produce 100-percent mortality. Such a reduction in toxicity, as shown in figure 1, might conceivably be explained as due to volatilization or chemical decomposition. Little is known about the rate of volatilization of DDT in suspension, though dry DDT is

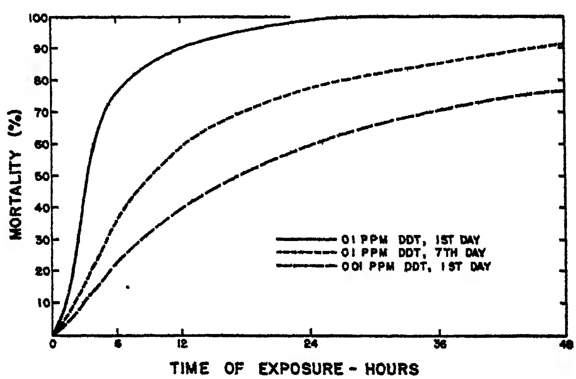

FIGURE 1.—Time-mortality curves showing the effect of aging on the speed of action of 0.1 p. p. m. DDT against third-instar larvae of *Anopheles quadrimaculatus* (Say)

extremely nonvolatile. Chemical methods of analysis now available are not sufficiently accurate, when working with such small quantities, to provide conclusive evidence on possible chemical decomposition. However, in view of what is known concerning the chemistry of DDT, it seems more reasonable to explain the reduction in toxicity as a result of a physical change associated, possibly, with the evaporation of the mutual solvent or with the agglomeration and precipitation of the suspended particles of DDT.

Without minimizing the importance of the physical factors already discussed, it is apparent that there are other factors associated with the presence of mud that are also of importance. Arnold et al. (*3*) provided preliminary evidence that organisms living in the bottom mud were not directly responsible for the inactivation of the DDT.

Further evidence has been obtained by autoclaving mud preparations just before adding the DDT and then using sterile technique in introducing the DDT, assuming the solution of DDT in 95-percent ethyl alcohol to be sterile. Three series of containers were so prepared, each containing 25 gm. (dry weight) of mud and 250 ml. of a 1-p. p. m. DDT suspension. Larvae were immediately added to the first series, and 1 week later a few larvae were able to survive in this preparation. Two weeks after preparation, less than 25 percent of the larvae were killed, and before the expiration of 3 weeks, no toxicity at all was apparent. At this time, larvae were added to the second series which had been held sterile and undisturbed since preparation. At the same time, each container of the third series, which had also been held sterile up to this time, was inoculated with 1 ml. of the supernatant water from the first series, which had lost its toxicity. This third series was then left undisturbed for another 3 weeks.

The second series, which had been held sterile and undisturbed for 3 weeks, was toxic when larvae were first added. However, on the second day several larvae survived, and by the fifth day there was no evidence of toxicity. Apparently, the greater portion of the DDT had been inactivated while being held undisturbed in a sterile condition. Probably a small quantity of DDT, possibly floating on the water surface, had produced toxicity when larvae were first added but had lost its toxicity rapidly when disturbed.

The third series, which had been inoculated with water from the first series, had developed such a growth over its surface after 3 additional weeks, that it was impossible to test it for toxicity.

It is entirely possible that some DDT is occluded by the bottom mud, by the aquatic biota, or by both. In at least one case, DDT was inactivated by a gelatinous preparation of montmorillonite, which fails to absorb DDT from alcohol. If simple occlusion were the im-

portant factor in the loss of toxicity in laboratory preparations, then at least some of the toxicity should be recoverable by stirring the mud in the presence of larvae. After repeated tests this phenomenon has failed to occur. However, after the organic content of a sample of mud was destroyed by heating to a constant weight in a muffle furnace, the inorganic residue failed to inactivate DDT. Clean inorganic sand and aquatic plants (i. e., *Elodea* and *Utricularia*) have failed to inactivate DDT in the absence of mud. Therefore, it is concluded that any occlusion which takes place is inadequate to explain the observed inactivation of DDT.

Adsorption of the DDT by certain constituents of the mud seems to be the most important factor. It can be shown that activated carbon ("Nuchar W")[3] can adsorb DDT not only from water suspension but also from alcoholic solution. Fifty milligrams of DDT dissolved in 50 ml. of 95-percent ethyl alcohol was held in contact with 10 gm. of the activated carbon for several days. When 0.1 ml. of the supernatant alcohol was added to 300 ml. of tap water in a 600-ml. beaker, the solution was found to be nontoxic to larvae. If the DDT had remained in solution in the alcohol (as it did in the absence of the activated carbon), the preparation should have contained about 0.3 p. p. m. of DDT and would have been highly toxic. Therefore, it was concluded that the activated carbon had adsorbed the DDT from the alcoholic solution. That the adsorption did not go to completion was shown by removing about 25 ml. of the alcohol by filtrating and evaporating to dryness. The deposit in this container was highly toxic to larvae when water was added. In similar tests, using 1 mg. of DDT in 50 ml. of alcohol in contact with 25 gm. of clean mineral sand, 1 ml. of the supernatant alcohol in 400 ml. of water produced a 100-percent mortality in 6 hours. Using Meadol[4], the mortality was only 20 percent in 6 hours. With various samples of dried mud, the 6-hour mortality varied from 60 to 100 percent.

In a similar experiment, using 1 mg. DDT, 100 ml. alcohol, and 10 or 50 gm. of adsorbent, 0.3 ml. of the alcohol-DDT without adsorbent killed 100 percent of the larvae of both *A. quadrimaculatus* and *A. aegypti* within 24 hours. When 10 gm. of activated carbon was used as an adsorbent, 10 percent of the *A. quadrimaculatus* larvae and none of the *A. aegypti* larvae were killed in 24 hours. Using 50 gm. of dried mud as an adsorbent, 0.3 ml. of supernatant alcohol killed all the larvae of *A. quadrimaculatus*, but only 20 percent of the *A. aegypti* larvae, in the 24-hour period. Using 50 gm. of fresh cow manure as the adsorbent, the results were the same as with mud.

[3] Nuchar W is a product of Industrial Chemical Sales Division, West Virginia Pulp & Paper Co., New York, N. Y.

[4] Meadol is a lignin product of Mead Co., Cincinnati, Ohio. It was kindly furnished by Dr. S. Gottlieb, U. S. Bureau of Plant Industry.

Further tests, using a variety of inorganic adsorbents such as activated alumina, a special activated fuller's earth, kaolinite, montmorillonite, and kieselguhr, failed to detect any adsorption of DDT from alcohol by any of these inorganic materials.

When these same materials were tested in water by making a slurry, adding about 350 ml. of water and 0.25 mg. of DDT dissolved in 0.25 ml. of alcohol to them, essentially similar results were obtained. Within 24 hours of the addition of DDT, the preparation containing 10 gm. of activated carbon showed no toxicity whatsoever. The lignin product, Meadol, and certain mud samples reduced the toxicity to 30 percent or less in 24 hours over a period of 5 to 10 days. Other mud samples required 2 to 3 weeks to produce a similar reduction in toxicity, and sand failed to reduce the toxicity noticeably over a period of 100 days.

To make sure that the observed removal of DDT from solution or from water was not actually a chemical decomposition, several samples that had lost their toxicity were analyzed for p, p′-DDT, using a modification of the Bent method. One such sample had had 1 mg. of DDT added to it, and a second had 2 mg. DDT. Both of these had lost their toxicity over a period of several months, and both had dried at least once and were finally analyzed about 9 months after preparation. A control test was run, using sand to which 1 mg. of DDT had been added. It was handled in the same manner as the other two samples and was still toxic after 9 months, killing all larvae within 24 hours. The recovery in these cases ranged from 20 to 30 percent of the amount of DDT originally added. Some of the DDT may have adhered to the glassware, which had a tenacious deposit of salts, in spite of washing with benzene. Some of the DDT may have undergone decomposition during the 9-month interval. But it is significant that the percentage recovery was essentially the same or slightly higher for the mud samples which had lost their toxicity than for the sand sample which was still highly toxic. Moreover, the recovery (0.23 mg. from one, and 0.56 mg. from the other, mud sample and 0.21 mg. from the sand) was sufficiently high in every case to have produced a high toxicity if freshly prepared.

As previously reported (*3*), a 100-gm. sample of mud has failed so far to adsorb more than 4 mg. of DDT over periods of time ranging up to 1 year. It is possible that this relatively small amount (4 parts in 100,000) does not represent saturation but is simply a limit imposed by time, for the adsorption of DDT from water by mud does take place very slowly as compared to more familiar adsorption phenomena. This may be due to the exceedingly slight solubility of DDT in water. If a suspension of DDT in water is filtered through a Seitz filter, the filtrate is nontoxic to insectary-reared, fourth-

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instar larvae of *A. quadrimaculatus*. Ignoring the possibility that an appreciable amount of DDT would be adsorbed on the inorganic filter during the process of filtration, this would indicate that the solubility of DDT in water at room temperature is appreciably less than 1 part in 100,000,000. In any case, when DDT is added to mud in small increments, allowing time for adsorption between additions, the rate of adsorption seems to remain fairly constant over several such additions. Agitation of the mud has little effect on this rate. Fifty-gram samples of dried mud, selected from some 21 different anopheline breeding areas scattered over 9 southeastern States, were placed in containers with 350 ml. of tap water. Alcohol, containing 0.25 mg. of DDT, was added to each, and larvae were added periodically to test the toxicity of the preparation. When toxicity was no longer apparent, another 0.25 mg. of DDT was added. This was continued until some samples had inactivated eight additions, or a total of 2.0 mg. of DDT. The last addition, in some cases, required no longer for inactivation than did the first addition. There was, however, a great difference between these samples from different sources in the length of time required for the adsorption. Some samples inactivated the 0.25 mg. of DDT in as little as 10 days, whereas other samples required as long as 90 days. Controls with sand lost their initial toxicity only after 100 days. It has been suggested that the glassware itself might adsorb DDT, thus explaining the reduction in effectiveness of the lower dosages in the absence of mud. Preliminary tests with glass wool have not substantiated this theory.

Through the courtesy of Dr. Sidney Gottlieb of the Division of Soils, Fertilizers, and Irrigation, of the United States Bureau of Plant Industry, seven of these samples were analyzed for the total organic carbon and for the moisture equivalent (which is considered a measure of soil colloids). The results, presented in table 1, indicate a marked correlation between the organic-carbon content of the sample and the mean amount of DDT adsorbed over a period of 10

TABLE 1.—*Mean amount of DDT adsorbed by 50 gm. of mud over a 10-month period as related to the organic-carbon content and the moisture equivalent of the mud*

Source of mud	Moisture equivalent	Percentage carbon	Amount of DDT adsorbed (in milligrams)
Fort Smith, Ark.	21.3	0.92	0.75
Do.	33.8	2.14	1.125
Blytheville, Ark.	25.4	2.36	1.50
Norfolk, Va.	20.6	3.34	1.00
Marked Tree, Ark.	41.2	5.28	1.375
Montgomery, Ala.	50.8	11.56	1.625
Elizabeth City, N. C.	68.1	14.21	1.75

months. The moisture equivalent was also correlated with the number of additions of DDT, but the high correlation between moisture equivalent and organic carbon might suggest that both the moisture equivalent and the ability to adsorb DDT may be in some way dependent upon organic-carbon content. Certainly, when the results of these analyses are considered in the light of the results of tests with standard adsorbents, the conclusion that DDT is adsorbed principally if not entirely on organic materials appears justified.[5]

SUMMARY

Several factors may contribute to the relatively rapid loss in effectiveness of DDT applied in safe dosages for the control of anopheline mosquito larvae. Of these, the two most important appear to be redistribution of the DDT due to wind and wave action, and precipitation of suspended DDT and adsorption of DDT by some part of the bottom-mud complex. Adsorption is relatively slow on mud and appears to be on the organic components of the mud only, sandy soils with a minimum of organic material being rather poor adsorbents. It has been suggested that the use of competitive adsorbents might be of value, if it were possible to find a nontoxic substance that could be mixed with the DDT and applied with it, being adsorbed more readily than the DDT and thus preventing the adsorption of the DDT itself.

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ISOLATION OF AN UNIDENTIFIED SPIROCHETE FROM HEN'S EGGS AFTER INOCULATION WITH LIVER TISSUE FROM HENS[1]

By Edward A. Steinhaus, *Associate Bacteriologist*,[2] and Lyndahl E. Hughes, *Scientific Aide, United States Public Health Service*

Observations made at the Rocky Mountain Laboratory in early 1944 indicated the occurrence in the vicinity of Hamilton, Mont., of a spirochete in the tissues of hens and/or hen's eggs. These observa-

[5] This problem was discussed with Dr. S. B. Hendricks of the U. S. Bureau of Plant Industry and he indicates that this conclusion might be expected on the basis of the molecular structure of DDT.

[1] Contribution from the Rocky Mountain Laboratory (Hamilton, Mont.) of the Division of Infectious Diseases of the National Institute of Health.

[2] Now at the University of California, Berkeley, Calif.

tions were made incidental to checking for the occurrence of disease in local flocks from which eggs were being obtained for laboratory use. This is the first known evidence of the occurrence of a spirochete in the tissues of hens in the United States.[3] Therefore, it has been felt desirable to report this finding, since it is of potential interest to laboratory workers using chick embryos for culturing various pathogens or for manufacturing vaccines.

On March 4, 1944, a white leghorn hen from flock G and a Rhode Island Red from flock W were killed and autopsied. No gross evidence of disease was noted. Liver tissue from each hen was homogenized in dextrose saline and was inoculated into the yolk of 5-day-old fertile eggs. Most of the embryos died on the eighth and tenth days, and, together with the embryonic membranes, were examined microscopically. In smears stained by the method of Macchiavello and by that of Giemsa, numerous bodies, some of them distinctly spiral shaped, were seen. They stained a bluish pink with Macchiavello's stain and a bluish purple with Giemsa's, and were gram negative.

Further observation of their morphology showed the organisms to be spirochetes. In smears of the tissues of infected eggs, the largest forms were approximately 0.4 to 0.6 by 8.0 to 10.0 microns and had from four to six undulations. The majority were much shorter, many of them being mere granules. All sizes were frequently observed in one field. In some preparations, the granules were present in large numbers, frequently appearing in the cytoplasm of the cells of the yolk sac. No granules were observed in the tissues of eggs not containing spirochetes.

On March 15, a white leghorn hen from a third flock (flock D) was similarly examined. The findings were essentially the same as those just described. The strain isolated from flock D was carried through 13 passages in 5-day-old fertile eggs, the incubation period ranging from 4 to 7 days.

Six eggs were used for each of the three isolations. Seven of the eighteen embryos died before the end of the second day; their tissues were not examined. Spirochetes were found in all of the 11 eggs from which smears were made.

Three mature hens were inoculated both intramuscularly and intraperitoneally with a yolk-sac suspension of the strain from flock D, but none of the birds showed any symptoms over a period of one month. No attempt was made to recover the strain from these inoculated hens. The spirochete was apparently not pathogenic for guinea pigs or white mice. Specific identification of the spirochete

[3] Subsequent to these observations, spirochetal infection was observed in a flock of adult turkeys in California The findings have recently been reported by Hoffman, Jackson, and Rucker· J Am. Vet. Med. Assoc , 108: 329–32 (May 1946). Harris, M B K (Am J. Hyg , 12: 537–568, November 1930) has reported the occurrence of spirochetes in the caeca of chickens.

was not obtained and, unfortunately, further observations were not possible at the time.

A strain of the spirochete was recently reestablished in eggs by Hughes with lyophilized yolk-sac material that had been stored for nearly 2 years at 40° F. Six eggs were inoculated. None of the embryos was dead by the seventh day. They were therefore sacrificed and their tissues examined. Spirochetes were not observed, but yolk-sac material from one egg was passed to six more eggs. Spirochetes were present in all eggs of this passage and of subsequent ones. At this time, another attempt was made to infect hens. Two 21-day-old chickens were injected intravenously with infected yolk-sac material. These chickens remained afebrile and appeared healthy. One was sacrificed on the twentieth day and brain-liver tissue suspension was used to inoculate six eggs. The embryos were dead on the seventh day, and spirochetes were found in the tissues of all the eggs. The second chicken was sacrificed on the twenty-sixth day and the same procedure was followed, with negative findings.

DISCUSSION

A natural suspicion would be that this spirochete is related to those causing fowl spirochetosis, *Borrelia anserina* (*Spirochaeta anserina*) or *Borrelia gallinarum* (*Spirochaeta gallinarum*) which most authorities now consider to be identical. The latter organisms, however, are described as being longer and more loosely curved than is the unknown spirochete, although these characteristics may be dependent upon the medium in which they are grown. The fact that the spirochete discussed here failed to produce discernible symptoms in inoculated chickens may indicate a difference from the known infectious agent of fowl spirochetosis. Whether or not it was in any measure responsible for the symptoms exhibited by the original hens is not known.

It is pertinent to add that although *Argas persicus*, the principal vector of fowl spirochetosis in many other countries, is quite prevalent in some parts of the United States, it does not occur locally. Lice were present in the three flocks but were not numerous and the species were not determined.

SUMMARY

The recovery of an unidentified spirochete, apparently from hens, but possibly also from hen's eggs, is reported. This is the first known evidence of the occurrence of a spirochete in the tissues of hens in the United States. This finding is of possible interest to laboratory workers because of the use of hen's eggs for the culture of various pathogens and for the manufacture of vaccines.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED FEBRUARY 8, 1947

Summary

A total of 3,624 cases of influenza was reported, as compared with 3,432 last week, the latter figure being the smallest weekly number reported this year. The 5-year (1942–46) median is 5,376. Decreases were reported in all of the nine geographic divisions except the West South Central and Mountain areas. The increase in these areas, as well as in the country as a whole, is accounted for chiefly in the increases in Texas, 2,013 (last week 1,519, next preceding week 2,280), Colorado, 144 (last week 48), and Arizona, 177 (last week 156). Virginia reported 371 cases (last week 430), and South Carolina 409 (last week 633). No State other than those named above reported more than 94 cases. The total for the year to date is 23,966, as compared with 139,368 for the same period last year and a 5-year median of 27,772.

Currently, 46 cases of poliomyelitis were reported as compared with 58 last week, 32 and 52, respectively, for the corresponding weeks of 1946 and 1945, and a 5-year median of 28. Since July 13, 1946, the weekly incidence has been continuously above that for every corresponding week of the past 18 years. The current incidence is above that for the corresponding weeks of those years except 1945. No State reported currently more than 4 cases, except California, which reported 15 cases (last week 8, next preceding week 18). The total for the year to date is 419, as compared with 280 for the corresponding period last year and a 5-year median of 192.

Of a total of 262 cases of amebic dysentery reported to date (last year 243), Texas has reported 57, Louisiana 42, Illinois 29; of 2,391 cases of bacillary dysentery (last year 2,019), Texas reported 2,254, South Carolina 55; and of 1,380 cases of unspecified dysentery (last year 778), Texas reported 915, Virginia 241, and Arizona 188. The 5-year (1942–46) medians are as follows: Amebic 129, bacillary 1,385, unspecified 320.

To date 539 cases of undulant fever have been reported, as compared with 392 and 433, respectively, for the corresponding periods of 1946 and 1945.

Deaths recorded for the week in 93 large cities in the United States totaled 9,664, as compared with 9,602 last week, 10,211 and 9,953, respectively, for the corresponding weeks of 1946 and 1945, and a 3-year (1944–46) median of 9,953. The total for the year to date is 60,031, as compared with 64,467 for the corresponding period last year.

Telegraphic morbidity reports from State health officers for the week ended Feb. 8, 1947, and comparison with corresponding week of 1946 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46
	Feb. 8, 1947	Feb. 9, 1946		Feb. 8, 1947	Feb. 9, 1946		Feb. 8, 1947	Feb. 9, 1946		Feb. 8, 1947	Feb. 9, 1946	
NEW ENGLAND												
Maine	3	1	0	------	24	------	378	11	13	0	2	3
New Hampshire	1	0	0	------	6	------	20	4	5	0	2	2
Vermont	2	0	0	12	6	2	133	2	3	0	1	0
Massachusetts	19	4	4	------	------	------	476	236	415	2	8	8
Rhode Island	0	0	0	1	------	2	75	2	59	0	3	3
Connecticut	0	0	0	1	11	8	286	47	169	0	2	5
MIDDLE ATLANTIC												
New York	27	29	14	[1] 4	[1] 15	[1] 14	142	2,475	1,272	14	15	26
New Jersey	1	4	4	6	14	14	71	284	284	5	6	9
Pennsylvania	23	14	9	6	2	3	545	1,337	1,337	3	16	16
EAST NORTH CENTRAL												
Ohio	21	31	13	6	27	16	503	77	126	4	7	7
Indiana	8	19	5	3	59	27	41	229	229	1	2	2
Illinois	7	5	12	------	7	9	26	1,073	323	4	9	9
Michigan [2]	2	19	4	------	4	4	92	988	215	2	2	7
Wisconsin	2	1	1	13	252	50	157	139	328	1	2	3
WEST NORTH CENTRAL												
Minnesota	7	25	4	------	2	1	32	7	28	1	1	1
Iowa	1	1	2	------	------	------	11	21	102	1	5	0
Missouri	2	8	6	2	16	6	7	334	158	2	4	6
North Dakota	1	0	0	2	5	5	1	------	------	1	0	1
South Dakota	0	2	4	------	------	------	9	53	53	0	1	0
Nebraska	3	1	1	22	1	2	9	18	18	0	0	0
Kansas	6	17	5	15	88	7	7	439	268	0	0	0
SOUTH ATLANTIC												
Delaware	0	0	0	4	------	------	2	6	16	0	0	0
Maryland [2]	12	16	6	2	58	23	58	78	78	4	1	3
District of Columbia	0	0	0	2	4	3	10	25	25	0	1	1
Virginia	6	17	9	371	827	827	218	127	148	3	9	10
West Virginia	4	3	3	65	20	28	97	31	31	0	2	2
North Carolina	3	7	10	------	------	16	183	88	88	2	8	7
South Carolina	3	1	5	409	1,180	897	64	59	59	0	2	7
Georgia	9	4	8	26	75	152	188	4	131	4	2	2
Florida	4	9	5	5	3	3	13	3	29	1	0	4
EAST SOUTH CENTRAL												
Kentucky	5	5	6	1	6	9	1	259	48	4	12	5
Tennessee	6	11	7	26	57	63	88	51	55	2	4	6
Alabama	11	11	6	94	317	317	24	48	48	3	1	8
Mississippi [2]	5	6	4	------	------	------	------	------	------	2	4	4
WEST SOUTH CENTRAL												
Arkansas	2	6	7	62	260	260	74	112	113	3	2	3
Louisiana	0	5	8	1	1,279	23	------	60	60	0	5	5
Oklahoma	7	0	2	90	231	199	------	32	57	1	4	3
Texas	32	35	40	2,013	3,187	2,161	107	412	412	8	8	16
MOUNTAIN												
Montana	0	1	1	9	37	37	233	55	96	0	0	0
Idaho	0	3	0	13	113	2	7	71	37	0	0	0
Wyoming	0	1	0	------	4	18	4	24	56	0	0	1
Colorado	8	7	7	144	86	55	43	50	128	1	1	1
New Mexico	3	0	1	------	3	1	60	22	28	0	1	1
Arizona	3	2	2	177	164	155	48	7	18	0	1	0
Utah [2]	0	0	0	1	50	50	11	140	54	0	1	1
Nevada	0	0	0	------	------	------	------	3	6	0	0	0
PACIFIC												
Washington	4	9	3	1	------	------	40	504	153	1	2	3
Oregon	1	3	3	4	55	18	46	131	112	3	3	3
California	35	30	25	11	291	137	169	1,082	703	9	13	25
Total	299	373	305	3,624	8,846	5,376	4,899	11,260	12,893	92	175	244
6 weeks	1,873	2,489	2,057	23,966	129,368	27,772	[4] 24,090	39,642	62,348	516	1,295	1,416
Seasonal low week [3]	(27th) July 5–11			(30th) July 26–Aug. 1			(35th) Aug. 30–Sept. 5			(37th) Sept. 13–19		
Total since low	9,444	14,133	10,991	56,941	501,616	63,634	[4] 46,977	65,666	100,361	1,488	2,799	3,248

[1] New York City only.

[2] Period ended earlier than Saturday.

[3] Dates between which the approximate low week ends. The specific date will vary from year to year.

[4] Delayed report: Measles, West Virginia, 225 January cases, included in cumulative totals only.

Telegraphic morbidity reports from State health officers for the week ended Feb. 8, 1947, and comparison with corresponding week of 1946 and 5-year median.—Con.

Division and State	Poliomyelitis: Week ended— Feb. 8, 1947	Poliomyelitis: Week ended— Feb. 9, 1946	Poliomyelitis: Median 1942–46	Scarlet fever: Week ended Feb. 8, 1947	Scarlet fever: Week ended Feb. 9, 1946	Scarlet fever: Median 1942–46	Smallpox: Week ended— Feb. 8, 1947	Smallpox: Week ended— Feb. 9, 1946	Smallpox: Median 1942–46	Typhoid and paratyphoid fever[5]: Week ended— Feb. 8, 1947	Typhoid and paratyphoid fever[5]: Week ended— Feb. 9, 1946	Typhoid and paratyphoid fever[5]: Median 1942–46
NEW ENGLAND												
Maine	0	0	0	34	37	31	0	0	0	0	1	0
New Hampshire	1	0	0	7	8	9	0	0	0	0	0	0
Vermont	1	0	0	3	15	15	0	0	0	0	0	0
Massachusetts	0	0	0	168	179	373	0	0	0	0	0	0
Rhode Island	1	0	0	18	10	21	0	0	0	0	1	0
Connecticut	0	1	1	39	46	59	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York	2	2	2	388	505	505	0	0	0	2	0	1
New Jersey	1	0	0	149	106	140	0	0	0	1	3	1
Pennsylvania	2	1	0	215	265	367	0	0	0	4	0	6
EAST NORTH CENTRAL												
Ohio	3	1	0	327	310	306	0	0	0	0	2	2
Indiana	0	0	0	85	114	114	0	1	1	0	1	1
Illinois	2	0	0	130	273	273	0	0	0	3	4	2
Michigan[2]	1	0	1	118	154	230	0	0	0	0	0	1
Wisconsin	0	1	1	68	138	208	0	0	0	2	1	1
WEST NORTH CENTRAL												
Minnesota	3	0	0	40	58	93	0	0	0	0	0	0
Iowa	0	0	0	60	47	75	0	0	0	1	0	0
Missouri	1	0	0	41	90	93	0	0	0	0	0	2
North Dakota	0	0	0	6	5	27	0	0	0	0	0	0
South Dakota	0	0	0	8	14	35	0	0	0	0	0	0
Nebraska	0	0	0	35	21	32	0	0	0	1	0	0
Kansas	1	0	0	34	91	95	0	0	0	0	0	0
SOUTH ATLANTIC												
Delaware	0	0	0	12	5	8	0	0	0	0	1	0
Maryland[2]	0	1	0	27	51	88	0	0	0	0	0	0
District of Columbia	0	0	0	14	14	28	0	0	0	0	0	0
Virginia	0	0	0	31	66	66	0	0	0	2	1	1
West Virginia	0	1	1	30	32	37	0	0	0	0	1	1
North Carolina	1	1	0	44	49	48	0	0	0	2	2	1
South Carolina	0	0	0	3	6	6	0	0	0	1	0	0
Georgia	0	1	0	19	13	27	0	0	0	0	2	3
Florida	4	1	0	17	9	11	0	0	0	2	1	1
EAST SOUTH CENTRAL												
Kentucky	0	1	1	45	52	65	0	0	0	1	0	0
Tennessee	0	1	1	44	27	48	0	0	0	1	0	0
Alabama	3	0	1	15	8	22	0	1	0	0	0	1
Mississippi[2]	0	1	0	9	9	10	0	0	0	1	0	1
WEST SOUTH CENTRAL												
Arkansas	0	0	0	5	13	7	0	0	0	4	1	1
Louisiana	0	2	1	1	10	7	0	0	0	0	1	3
Oklahoma	1	0	0	7	24	26	0	0	0	1	0	1
Texas	2	4	1	41	56	62	0	2	2	2	4	4
MOUNTAIN												
Montana	0	1	0	1	6	28	0	0	0	0	0	0
Idaho	0	0	0	13	5	18	0	0	0	0	1	0
Wyoming	0	0	0	7	6	6	0	0	0	0	0	0
Colorado	0	0	0	49	48	48	0	0	0	1	0	0
New Mexico	0	0	0	8	26	8	0	0	0	0	0	0
Arizona	0	1	0	11	24	21	0	0	0	0	0	0
Utah[2]	0	0	0	24	14	63	0	0	0	0	0	0
Nevada	0	0	0	2	0	0	0	0	0	0	0	0
PACIFIC												
Washington	0	6	2	34	26	45	0	0	0	1	3	1
Oregon	1	0	0	26	24	24	0	0	0	1	1	0
California	15	4	4	134	215	215	0	0	0	1	2	2
Total	46	32	28	2,646	3,324	3,823	0	4	11	35	34	67
6 weeks	419	280	192	15,039	17,479	22,010	23	39	80	254	239	352
Seasonal low week[3]	(11th) Mar. 15–21			(32nd) Aug. 9–15			(35th) Aug. 30–Sept. 5			(11th) Mar. 15–21		
Total since low	25,193	13,617	12,258	41,725	56,050	60,953	77	115	197	3,782	4,490	5,456

[2] Period ended earlier than Saturday.
[3] Dates between which the approximate low week ends. The specific date will vary from year to year.
[5] Including paratyphoid fever reported separately, as follows: New Jersey 1.

Telegraphic morbidity reports from State health officers for the week ended Feb. 8, 1947, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Whooping cough			Week ended Feb. 8, 1947							
	Week ended—		Median 1942–46	Dysentery			Encephalitis, infectious	Rocky Mt. spotted fever	Tularemia	Typhus fever, endemic	Undulant fever
	Feb. 8, 1947	Feb. 9, 1946		Amebic	Bacillary	Unspecified					
NEW ENGLAND											
Maine	10	21	27								
New Hampshire		6	9								1
Vermont	21	24	28								3
Massachusetts	197	117	117								
Rhode Island	22	45	21								
Connecticut	50	37	52								3
MIDDLE ATLANTIC											
New York	200	214	278	7	3				1	1	10
New Jersey	145	103	103	1							1
Pennsylvania	152	141	148						1		8
EAST NORTH CENTRAL											
Ohio	176	90	183						1		5
Indiana	27	40	24			1	2		3		3
Illinois	128	100	100	9			1		12		8
Michigan [3]	142	88	106								3
Wisconsin	162	67	102				1				8
WEST NORTH CENTRAL											
Minnesota	4	4	31	1							
Iowa	11	5	15	3			1				10
Missouri	25	1	14			1					5
North Dakota			3								1
South Dakota	3		3								
Nebraska	19	3	4								1
Kansas	18	15	39								13
SOUTH ATLANTIC											
Delaware	10	7	1								
Maryland [3]	87	22	53			1					
District of Columbia	1	3	10						1		
Virginia	84	47	49			43			1	1	
West Virginia		10	38								
North Carolina	30	63	92						2		
South Carolina	37	42	45	2	3				2	1	
Georgia	7	6	14	2	3				1	10	
Florida	41	24	15			1				4	1
EAST SOUTH CENTRAL											
Kentucky	29	11	42				1				2
Tennessee	25	16	26				2		6	1	5
Alabama	20	20	15	5					1	8	2
Mississippi [3]									3	1	1
WEST SOUTH CENTRAL											
Arkansas	7	15	21		1				3		
Louisiana	6	3	3	23							
Oklahoma	5	9	10	1					2		2
Texas	474	87	181	14	220	54				10	11
MOUNTAIN											
Montana	4		21								1
Idaho	1	14	6								
Wyoming	1	2	3								
Colorado	12	12	35								2
New Mexico	10	2	6		1						
Arizona	34	11	29	1		12					1
Utah [3]		34	33								2
Nevada			1								
PACIFIC											
Washington	44	28	28	4		14	1				2
Oregon	16	18	18								
California	108	65	208	4			1			1	5
Total	2,605	1,692	2,304	77	231	127	10	0	40	38	120
Same week, 1946	1,692			45	271	86	3	0	8	41	71
Median, 1942–46	2,304			15	271	60	4	1	12	45	[6] 75
6 weeks: 1947	14,728			262	2,391	1,380	42	1	298	[7] 307	539
1946	10,925			243	2,019	778	45	1	130	337	392
Median, 1942–46	13,692			129	1,385	320	45	1	130	337	[6] 413

[3] Period ended earlier than Saturday.

[6] 2-year average, 1945–46.

[7] Correction: Typhus fever, Arkansas, week ended January 18, 2 cases (instead of 4).

Anthrax: Pennsylvania 1 case.

WEEKLY REPORTS FROM CITIES [1]

City reports for week ended Feb. 1, 1947

This table lists the reports from 85 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0	------	0	31	1	4	0	2	0	0	2
New Hampshire:												
Concord	0	0	------	0	------	0	0	0	1	0	0	-----
Vermont:												
Barre	0	0	------	0	4	0	0	0	0	0	0	9
Massachusetts:												
Boston	13	0	------	0	20	0	9	0	18	0	0	62
Fall River	0	0	------	0	4	0	0	0	4	0	0	5
Springfield	0	0	------	0	7	0	0	0	2	0	0	19
Worcester	0	0	------	0	3	0	14	0	3	0	0	21
Rhode Island:												
Providence	0	0	------	0	36	0	3	0	5	0	0	7
Connecticut:												
Bridgeport	0	0	------	0	16	0	0	0	0	0	0	2
New Haven	0	0	------	0	46	0	2	0	9	0	0	2
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0	------	0	------	0	2	0	7	0	0	3
New York	24	0	9	0	77	5	66	5	132	0	3	75
Rochester	0	0	------	1	------	1	1	0	15	0	0	3
Syracuse	4	0	------	0	------	1	1	0	21	0	0	16
New Jersey:												
Camden	0	0	------	0	------	0	1	0	3	0	0	9
Newark	0	0	2	1	5	2	5	0	20	0	0	32
Trenton	0	0	------	0	18	0	3	0	6	0	1	6
Pennsylvania:												
Philadelphia	2	0	2	0	12	0	28	0	39	0	0	58
Pittsburgh	3	0	2	2	126	4	4	0	21	0	0	13
Reading	0	0	------	0	------	0	1	0	0	0	0	6
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	2	0	1	1	------	2	4	0	7	0	0	12
Cleveland	1	0	1	0	258	1	8	0	26	0	0	20
Columbus	2	0	------	0	------	1	0	0	3	0	0	8
Indiana:												
Fort Wayne	0	0	------	0	9	0	0	0	1	0	0	----
Indianapolis	0	0	------	2	2	1	4	0	12	0	0	12
South Bend	0	0	------	0	------	0	0	0	3	0	0	1
Terre Haute	0	0	------	0	------	0	2	0	1	0	0	------
Illinois:												
Chicago	5	0	------	0	19	4	31	1	60	0	0	75
Michigan:												
Detroit	2	0	------	0	6	0	10	1	50	0	0	81
Flint	0	0	------	0	------	0	1	0	5	0	0	3
Grand Rapids	0	0	------	0	2	0	0	0	1	0	0	4
Wisconsin:												
Kenosha	0	0	------	0	------	0	0	0	1	0	0	2
Milwaukee	0	0	------	0	12	0	7	0	12	0	0	32
Racine	0	0	------	0	------	0	1	0	0	0	0	3
Superior	0	0	------	0	------	0	0	0	2	0	0	----
WEST NORTH CENTRAL												
Minnesota												
Duluth	0	0	------	0	------	0	2	0	0	0	0	4
Minneapolis	0	0	------	0	4	0	6	0	16	0	0	6
Missouri:												
Kansas City	1	0	------	0	1	0	10	0	9	0	0	3
St. Joseph	0	0	------	0	------	0	0	0	1	0	0	------
St. Louis	4	0	------	0	2	0	8	0	18	0	0	6

[1] In some instances the figures include nonresident cases.

City reports for week ended Feb. 1, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
WEST NORTH CENTRAL—continued												
Nebraska:												
Omaha	0	0		0	1	0	3	0	0	0	0	
Kansas:												
Topeka	0	0		0		0	1	0	5	0	0	
Wichita	0	0		0	1	0	4	0	2	0	0	2
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0		0		0	0	0	5	0	0	8
Maryland:												
Baltimore	5	0	2	1	3	1	11	1	14	0	0	55
Cumberland	0	0	1	1	16	0	2	0	0	0	0	
Frederick	0	0		0		0	0	0	0	0	0	
District of Columbia:												
Washington	1	0		0	26	0	9	1	4	0	0	3
Virginia:												
Lynchburg	0	0		0		0	0	0	3	0	0	1
Richmond	1	0		0	30	0	5	0	5	0	0	5
Roanoke	0	0		0	4	0	0	0	9	0	0	1
West Virginia:												
Charleston	0	0		0		0	0	0	5	0	0	
Wheeling	0	0		0	1	0	2	0	1	0	0	
North Carolina:												
Wilmington	0	0		0	1	0	3	0	0	0	0	
Winston Salem	0	0		0	28	0	1	0	4	0	0	1
South Carolina:												
Charleston	0	0	15	0		0	1	0	0	0	0	
Georgia:												
Atlanta	0	0	2	1	35	0	4	0	10	0	0	1
Brunswick	0	0		0		0	1	0	0	0	0	
Savannah	0	0	1	0	50	0	0	0	1	0	0	
Florida:												
Tampa	0	0	3	0		0	5	0	4	0	0	
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	3	0	1	1		0	10	0	2	0	0	4
Nashville	2	0		0		0	0	0	5	0	0	1
Alabama:												
Birmingham	1	0	11	2		0	1	0	1	0	0	
Mobile	0	0	2	2		0	0	0	0	0	0	
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	4	0	2	0	5	0	0	0	0	1
Louisiana:												
New Orleans	1	0	1	1	2	0	7	0	1	0	0	
Shreveport	0	0		0		0	2	0	1	0	0	
Texas:												
Dallas	1	0	1	1	3	0	2	0	3	0	0	5
Galveston	0	0		0		0	2	0	0	0	0	
Houston	3	0		2		0	5	0	3	0	1	2
San Antonio	0	0		0	4	0	6	0	0	0	0	3
MOUNTAIN												
Montana:												
Billings	0	0		0		0	1	0	0	0	0	
Great Falls	0	0		0	98	0	0	0	1	0	0	
Helena	0	0		0	13	0	1	0	0	0	0	
Missoula	0	0		0		0	1	0	0	0	0	
Idaho:												
Boise	0	0		0		0	3	0	0	0	0	
Colorado:												
Denver	1	0	4	1	15	0	10	0	31	0	0	2
Pueblo	0	0		0		0	4	0	3	0	0	
Utah:												
Salt Lake City	0	0		0	5	0	2	0	7	0	0	

City reports for week ended Feb. 1, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle	0	0	------	1	6	0	4	0	3	0	1	2
Spokane	0	0	------	0	11	0	3	1	2	0	0	1
Tacoma	0	0	------	0	------	0	0	0	3	0	0	3
California:												
Los Angeles	6	0	5	0	4	2	7	2	16	0	0	25
Sacramento	1	0	------	0	1	1	3	0	1	0	0	3
San Francisco	2	0	------	0	3	1	8	0	11	0	0	2
Total	91	0	70	21	1,082	28	377	12	697	0	6	753
Corresponding week, 1946	97	------	325	53	3,811	------	500	------	780	0	9	509
Average, 1942-46	77	------	357	[2] 68	[3] 3,296	------	[2] 496	------	1,356	0	12	713

[2] 3-year average, 1944-46. [3] 5-year median, 1942-46.

Anthrax.—Cases: Philadelphia 1.
Dysentery, amebic.—Cases: New York 5; Philadelphia 1; Chicago 1.
Dysentery, bacillary.—Cases: Tampa 1; Los Angeles 3.
Dysentery, unspecified.—Cases: Baltimore 1; San Antonio, 2.
Tularemia.—Cases: Indianapolis 1; Nashville 1.
Typhus fever, endemic.—Cases: Baltimore 2; Tampa 3; Nashville 1; Mobile 2; New Orleans 1; Houston 1; Los Angeles 1.

Rates (annual basis) per 100,000 population, by geographic groups, for the 85 cities in the preceding table (estimated population, 1943, 33,796,100)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England	37.2	0.0	0.0	0.0	478	2.9	91.6	0.0	126	0.0	0.0	369
Middle Atlantic	15.3	0.0	6.9	1.9	110	6.0	51.8	2.3	122	0.0	1.9	102
East North Central	7.4	0.0	1.2	1.8	189	5.5	41.7	1.2	113	0.0	0.0	155
West North Central	11.3	0.0	0.0	0.0	20	0.0	76.6	0.0	104	0.0	0.0	47
South Atlantic	11.6	0.0	39.8	5.0	321	1.7	72.9	3.3	108	0.0	0.0	124
East South Central	35.4	0.0	82.6	29.5	0	0.0	64.9	0.0	47	0.0	0.0	30
West South Central	14.3	0.0	17.2	11.5	29	0.0	83.2	0.0	23	0.0	2.9	32
Mountain	7.9	0.0	31.8	7.9	1,040	0.0	174.7	0.0	334	0.0	0.0	16
Pacific	14.2	0.0	7.9	1.6	40	6.3	39.5	4.7	57	0.0	1.6	57
Total	14.1	0.0	10.8	3.2	167	4.3	58.3	1.9	108	0.0	0.9	116

DEATHS DURING WEEK ENDED FEB. 1, 1947

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Feb. 1, 1947	Corresponding week, 1946
Data for 93 large cities of the United States:		
Total deaths	9,602	10,100
Median for 3 prior years	10,069	
Total deaths, first 5 weeks of year	50,367	54,256
Deaths under 1 year of age	810	586
Median for 3 prior years	602	
Deaths under 1 year of age, first 5 weeks of year	4,188	3,014
Data from industrial insurance companies:		
Policies in force	67,288,191	67,156,155
Number of death claims	13,746	16,146
Death claims per 1,000 policies in force, annual rate	10.7	12.7
Death claims per 1,000 policies, first 5 weeks of year, annual rate	9.9	11.9

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended January 18, 1947.—During the week ended January 18, 1947, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		21	1	292	577	44	37	83	132	1,187
Diphtheria		1		43	9	5		1		59
Dysentery, amebic					4					4
German measles				17	41		1	13	17	89
Influenza		23			5				2	30
Measles		178	3	109	72	147	203	290	444	1,446
Meningitis, meningococcus				1	2	1	4		1	9
Mumps		3		32	605	63	173	40	274	1,190
Poliomyelitis				1				1		2
Scarlet fever		2	3	133	106	5	1	2	7	259
Tuberculosis (all forms)		4	10	114	37	39	2		32	238
Typhoid and paratyphoid fever				14	1				2	17
Undulant fever					2				1	3
Venereal diseases:										
Gonorrhea		34	18	173	96	43	26	57	94	541
Syphilis	1	20	1	101	71	10	12	6	59	281
Other forms									2	2
Whooping cough		2		34	85	16	3	1	16	157

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From consular reports, international health organizations, medical officers of the Public Health Service and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

[C indicates cases]

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place		January–November 1946	December 1946	January 1947—week ended— 4	11	18	25
ASIA							
Afghanistan	C	35					
Burma	C	1,462	81	1			
Bassein	C	29					
Moulmein	C	188	16				
Rangoon	C	23					
Ceylon	C	98	4				
China:							
Anhwei Province	C	2,749					
Chekiang Province	C	4,641					
Formosa, Island of	C	3,029					
Fukien Province	C	1,358					
Foochow	C	712					
Honan Province	C	1,654					
Hopeh Province	C	338					
Hunan Province	C	2,040					
Hupeh Province	C	359					
Ichang Province	C	147					
Kiangsi Province	C	1,594					
Kiangsu Province	C	[1] 9,221					
Shanghai	C	[1] 4,573					
Kwangsi Province	C	956					
Kwangtung Province	C	4,964					
Canton	C	2,002					
Hong Kong	C	505					

[1] See footnote at end of table.

CHOLERA—Continued

Place		January–November 1946	December 1946	January 1947—week ended— 4	11	18	25
ASIA—continued							
China—Con.							
Kweichow Province	C	8					
Macao, Island of	C	2					
Shantung Province	C	21					
Szechwan Province	C	158					
Yunnan Province	C	17					
India	C	70,001	2,739				
Bombay	C	[2] 2					
Calcutta	C	1,877	48	12	31	39	
Cawnpore	C	45					
Chittagong	C	8					
Madras	C	5					
India (French)	C	4					
Indochina (French):							
Cambodia	C	432	76				
Cochinchina	C	867	38		30		
Bien Hoa	C	24					
Chaudok	C	21					
Mytho	C	144					
Rachgia	C	1					
Saigon-Cholon	C	58	30		15		
Vinh-long	C	7	8		4		
Laos	C	21	28				
Japan	C	1,204	25				
Korea (Chosen)	C	[3] 11,351					
Malay States	C	245					
Manchuria	C	18,554					
Mongolia	C	16					
Siam (Thailand)	C	3,871	508	65	168		
Bangkok	C	525	59	26	39		
Straits Settlements: Singapore	C	[2] 1					

[1] Includes imported cases.
[2] Imported.
[3] From the beginning of the outbreak in April or May to approximately Sept. 1, 1946.

PLAGUE

[C indicates cases; P, present]

Place		January–November 1946	December 1946	January 1947—week ended— 4	11	18	25
AFRICA							
Algeria	C	2					
Bechuanaland	C	21					
Belgian Congo	C	[1] 30	3				
British East Africa:							
Kenya	C	38					
Uganda	C	12					
Egypt	C	217					
Alexandria	C	126					
Ismailiya	C	27					
Matariya	C	12					
Port Said	C	19					
Suez	C	32					
Libya: Tripolitania—Plague-infected rats		1					
Madagascar	C	211	16	1			1
Union of South Africa	C	5	2	1			
ASIA							
Burma	C	1,452	251	67	93		
Bassein	C	28					
Mandalay	C	1					
Rangoon	C	154					
China:							
Chekiang Province	C	722					
Formosa, Island of	C	11					
Fukien Province	C	4,371					
Amoy	C	307					
Foochow	C	1,401	2				
Kiangsi Province	C	268					
Kwangtung Province	C	415					
Yunnan Province	C	280					
India	C	17,625	4,080				

See footnote at end of table.

PLAGUE—Continued

Place		January—November 1946	December 1946	January 1947—week ended—			
				4	11	18	25
ASIA—continued							
Indochina (French): Cochinchna	C	48					
Java	C	38			2	4	
Manchuria	C	[2] 316					
Palestine	C	16	1		1		
Siam (Thailand)	C	38	3		1		
EUROPE							
Great Britain: Malta, Island of	C	6					
Portugal: Azores	C	[3] 15	8				
NORTH AMERICA							
Canada.[4]							
SOUTH AMERICA							
Argentina:							
Buenos Aires	C	8					
Cordoba Province	C	1					
Bolivia:							
Chuquisaca Department	C	1					
Santa Cruz Department	C	12					
Tarija Department—Plague-infected rats		P					
Brazil:							
Alagoas State	C	2					
Bahia State	C	32					
Ceara State	C	44					
Minas Geraes State	C		12				
Parahyba State	C	18					
Pernambuco State	C	35					
Ecuador:							
Chimborazo Province	C	2	5				
Loja Province	C	34	4				
Peru:							
Lambayeque Department	C	14	1				
Libertad Department	C		7				
Lima Department	C	20	6				
Piura Department	C	34	5				
Tumbes Department	C	1					
Plague-infected rats		P					
Venezuela	C	1					
OCEANIA							
Hawaii Territory:[5] Plague-infected rats		6	1				

[1] Includes 16 cases of pneumonic plague.
[2] Includes 52 cases of pneumonic plague.
[3] Includes 2 cases of pneumonic plague.
[4] The imported suspected case previously reported has not been confirmed. Under date of Sept. 14, 1946, plague infection was reported in a pool of fleas from squirrels in Alsask and in a pool of fleas from squirrels in Superb, Saskatchewan, Canada.
[5] Plague infection was also proved in Hawaii Territory as follows: On Feb. 5, 1946, in a pool of 29 rats; on Apr. 13, 1946, in a pool of 54 fleas and 15 lice recovered from 7 rats and 22 mice; under date of July 3, 1946, in a pool of 50 fleas recovered from 7 rats and 46 mice, and in a pool of 51 fleas recovered from 10 rats; under date of July 17, 1946, in a pool of 48 fleas recovered from 22 rats, and in a pool of 56 fleas recovered from 33 rats; under date of Sept. 12, 1946, in a pool of 48 fleas recovered from 22 rodents; under date of Oct. 9, 1946, in a pool of 36 rats found on Sept. 10, 1946; on Jan. 9, 1947, in a pool of 31 rats.

SMALLPOX

[C indicates cases; P, present]

Place		January—November 1946	December 1946	January 1947—week ended 4	11	18	25
AFRICA							
Algeria	C	258					
Angola	C	179					
Basutoland	C	46					
Bechuanaland	C	11					
Belgian Congo	C	[1] 8,368	[1] 115	[1] 15			
British East Africa:							
Kenya	C	858	85	3	6	11	
Nyasaland	C	717	26		23	44	9
Tanganyika	C	6,004	756				
Uganda	C	568	6	4			

See footnote at end of table.

SMALLPOX—Continued

Place		January–November 1946	December 1946	January 1947—week ended— 4	11	18	25
AFRICA—continued							
Cameroon (French)	C	90	6				
Dahomey	C	1,581	10		5		
Egypt	C	391	13	5	7		
Eritrea	C	23					
French Equatorial Africa	C	162					
French Guinea	C	935	5		1		
French West Africa: Dakar District	C	40					
Gambia	C	7					
Gold Coast	C	1,360	132	59			
Ivory Coast	C	1,465	186		[2] 65		
Liberia	C	190	47				
Libya	C	708	215	74	92		90
Madagascar	C	1					
Mauritania	C	1					
Morocco (French)	C	1,875	15			[3] 19	
Morocco (Int. Zone)	C	178					
Morocco (Spanish)	C	5					
Mozambique	C	4					
Nigeria	C	6,157					
Niger Territory	C	529	34		[2] 28		
Rhodesia:							
Northern	C	424	12				
Southern	C	148					1
Senegal	C	95					
Sierra Leone	C	452					
Somaliland (Italian)	C	1					
Sudan (Anglo-Egyptian)	C	56					
Sudan (French)	C	1,987	54		[2] 13		
Swaziland	C	1	1				
Togo (French)	C	294	67		[2] 13		
Tunisia	C	376					
Union of South Africa	C	674	P		P	P	
ASIA							
Arabia	C	2					
Burma	C	1,835	120	50	39		
Ceylon	C	531	1				
China	C	2,057	630	126	62	76	40
India	C	58,638	1,815				
India (French)	C	3					
India (Portuguese)	C	19					
Indochina (French)	C	2,160	223		29	83	
Iran	C	31				1	
Iraq	C	22					
Japan	C	17,722	78	19	12		
Malay States	C	2,319	654	231	314	265	
Palestine	C	[4] 2					
Rhodes, Island of	C	[4] 1					
Siam (Thailand)	C	17,691	84	68	77		
Straits Settlements	C	177	27	22	6	11	5
Syria and Lebanon	C	8	1				
Turkey (see Turkey in Europe).							
EUROPE							
Czechoslovakia	C	24					
France	C	16					
Germany	C	1					
Gibraltar	C	[4] 3					
Great Britain:							
England and Wales	C	[5] 53					
Malta, Island of	C	10					
Scotland	C	2					
Greece	C	114					
Italy	C	627					
Portugal	C	57	1		1	1	
Spain	C	8					
Turkey	C	17					
Yugoslavia	C	1					
NORTH AMERICA							
Canada	C	2					
Guatemala	C	55	1				
Honduras	C	4					
Mexico	C	396					
Nicaragua	C	3					

See footnotes at end of table.

SMALLPOX—Continued

Place		January—November 1946	December 1946[2]	January 1947—week ended— 4	11	18	25
SOUTH AMERICA							
Argentina	C	69					
Bolivia	C	874	44				
Brazil	C	[1] 305	[1] 5	2			
Colombia	C	1,014	55		2		
Ecuador	C	82	38				
Paraguay	C	[1] 371					
Peru	C	506					
Uruguay	C	40					
Venezuela	C	[1] 1,745	[1] 26		[1] 50		
OCEANA							
Hawaii Territory	C	[6] 1					

[1] Includes alastrim.
[2] For the period Jan. 1–10, 1947.
[3] For the period Jan. 1–20, 1947.
[4] Imported.
[5] Includes imported cases.
[6] Off-shipping.

TYPHUS FEVER*

[C indicates cases; P, present]

Place		January—November 1946	December 1946	January 1947—week ended— 4	11	18	25
AFRICA							
Algeria	C	783					
Basutoland	C	7	3				
Belgian Congo [1]	C	2,557	10	17			
British East Africa:							
Kenya	C	27					
Uganda	C		1				
Egypt	C	1,393	14	3			
Eritrea	C	1,324	62	53		27	
French West Africa: Dakar District	C	7					
Libya	C	88					
Madagascar [3]	C	1					
Morocco (French)	C	3,744	42				
Morocco (Int. Zone)	C	53					
Morocco (Spanish)	C	25					
Nigeria	C	34					
Rhodesia, Northern	C	1					
Sierra Leone [1]	C	6					
Tunisia [1]	C	280					
Union of South Africa [1]	C	510	P		P	P	
ASIA							
Arabia [3]	C	2					
Burma [1]	C	3	1				
China [1]	C	381	4				
India	C	299	1				
Indochina (French)	C	61	9				
Iran	C	149					
Iraq	C	205	14	6	4	1	2
Japan	C	30,907	234	39	70		
Malay States	C	3					
Manchuria	C	89	1				
Palestine [1]	C	92					
Philippine Islands [1]	C	4					
Straits Settlements	C	2	1	1			
Syria and Lebanon	C	85					
Trans-Jordan	C	21					
Turkey. (See Turkey in Europe.)							
EUROPE							
Albania	C	121					
Austria	C	35					
Belgium [1]	C	14					
Bulgaria	C	1,033	87	27	39		
Czechoslovakia [1]	C	788	11				
France [1]	C	16				2	
Germany	C	1,869	3				
Gibraltar [3]	C	1					
Great Britain:							
England and Wales	C	1					
Malta and Gozo [1]	C	31					
Greece [1]	C	584	47	13	3	9	
Hungary	C	1,046	60	23	17	16	

See footnotes at end of table.

TYPHUS FEVER*—Continued

Place		January—November 1946	December 1946	January 1947—week ended— 4	11	18	25
EUROPE—continued							
Italy	C	25					
Netherlands [1]	C	24	1				
Poland	C	3,357	39	5			
Portugal	C	12	2			1	
Rumania	C	9,747	503	279			
Spain	C	28					
Canary Islands	C	2					
Sweden [2]	C	1					
Switzerland [1]	C	2					
Turkey	C	1,325	87	23	18	20	
Union of Soviet Socialist Republics: Ukraine	C	P					
Yugoslavia	C	2,971					
NORTH AMERICA							
Costa Rica [2]	C	77	6				3
Cuba [2]	C	20	1				
Guatemala	C	755	24				
Jamaica [2]	C	38	3				
Mexico	C	1,729					
Panama Canal Zone	C	1					
Panama (Republic)	C	4					
Puerto Rico [2]	C	101	4	2			
Salvador	C	1					
Virgin Islands [2]	C	3					
SOUTH AMERICA							
Argentina	C	7					
Bolivia	C	249	7				
Brazil [1]	C	16	1				
Chile	C	547					
Colombia	C	685	288				
Curacao [2]	C	1					
Ecuador [1]	C	1,012	84				
Paraguay	C	1					
Peru	C	1,023					
Venezuela [1]	C	101	3				
OCEANIA							
Australia [2]	C	147	3	1	1		
Hawaii Territory [2]	C	86	3	1	2	1	

* Reports from some areas are probably murine type, while others probably include both murine and louse-borne types.
[1] Includes cases of murine type.
[2] Murine type.

YELLOW FEVER

[C indicates cases, D, deaths]

Place		January—November 1946	December 1946	January 1947—week ended— 4	11	18	25
AFRICA							
French Equatorial Africa: Carnot	C	[1] 3	[2] 5				
Ivory Coast: Seguela	C	1					
Nigeria:							
Ibadan	C	1					
Ilorin	C	1					
Kafanchan	C	2					
Ogbomosho	C	41					
Sierra Leone: Pujehan	C	1					
SOUTH AMERICA							
Bolivia: Santa Cruz Department	D	[3] 40					
Brazil: Para State	D	1					
Colombia:							
Antioquia Department	D	1					
Caqueta Territory	D	2					
Magdalena Department	D	1					
Santander Department	D	13	3		1		
Peru: San Martin Department	D	3					
Venezuela:							
Tachira State	C	4					
Trujillo State	C	4					
Zulia State	C	4					

[1] Includes 2 suspected cases. [2] Diagnosis confirmed in 4 cases.
[3] Diagnosis confirmed in 14 cases and 10 deaths.

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

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EDITORIAL

ADVISING THE SUSPECT CASE

Mass radiography surveys in recent years have brought to the attention of the medical profession thousands of persons with X-ray evidence of pulmonary tuberculosis. Careful radiological and laboratory studies have led to the identification of clinical cases—with and without positive sputum, subclinical cases, and suspects. Attention has, of course, been directed first toward the clinical and then toward the subclinical cases. Suspects have been neglected in favor of those who present unmistakable roentgenological and bacillary evidence of tuberculosis. The overcrowded physicians' offices and other medical facilities of our country create a condition which tends to encourage such an attitude. Scarcity of trained personnel and the pressure of daily professional duties prohibit the necessarily prolonged management of the suspect case. Even though the suspect does not require immediate medical or hospital care, he should not be forgotten. He needs to be advised about his condition and guided toward sound health habits over a prolonged period until his final diagnosis is established.

Such advice should be given to all persons who are classified as "suspects," although some accommodate themselves unaided. The physician, the public health nurse, and the medical social worker can serve as advisers in each case, so that no one will lack the advantages of aid during the critical period that precedes adjustment.

It is not enough to inform the suspected person that he may have early tuberculosis and that he must return to his physician or clinic for periodic reexaminations. Worry, confusion, impatience, endured for many months, can undermine all the advantages of early case finding.

Specifically, the suspected person should be assured at the outset that even in the event of a final diagnosis of tuberculosis, there is no real occasion for alarm. The nature of the disease and its favorable

This is the thirteenth of a series of special issues of PUBLIC HEALTH REPORTS devoted exclusively to tuberculosis control, which will appear the first week of each month. The series began with the Mar. 1, 1946, issue. The articles in these special issues are reprinted as extracts from the PUBLIC HEALTH REPORTS. Effective with the July 5 issue, these extracts may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., for 10 cents a single copy. Subscriptions are obtainable at $1.00 per year; $1.25 foreign.

prognosis if discovered early should be made plain. Even highly educated and widely informed persons know little about tuberculosis. For the most part, the word is associated inevitably with death. Misconceptions and old wives' tales are entertained by the emotions even when they have been intellectually rejected.

It is the first task of the physician, public health nurse, or medical social worker to find the "teachable moment"—the pertinent psychological occasion—and to begin the reeducation process which, in replacing error with truth, permits the growth of confidence and understanding. A nice balance, determined by the character and background of the person, must be maintained between the seriousness of the prospect of tuberculosis and the optimism predicated on a favorable outcome. The possible necessity for changes in ways of life and plans for the future could be discussed. This, however, should be done gradually. A sick mind, like a sick body, must assume new values only at that speed which it can individually assume.

The suspected person should be encouraged to return to the clinic or physician for other than medical advice. If the suspect plans to change his job, with or without adequate reason, he should not do so without proper guidance, based on sound medical reasons. If the home life presents serious problems, the services of the public health nurse or medical social worker would be helpful.

Through such guidance the suspected person and the supervisory and professional staff come to a helpful understanding of each other. The individual comes to an appreciation of what it means to be well. The professional person gains new insight into the complexities of human beings. If the suspected person is finally diagnosed as tuberculous, he is prepared for the disciplines of sanatorium life and medical care. If he is found to be nontuberculous, new and useful health habits will have been established, which may make for a fuller and happier existence.

No one knows how many thousands of suspects the community loses through maladjustment or through unnecessary advancement of disease. Because of the lack of advisory and educative care and adequate medical follow-up, the number lost must be great.

To be sure, such a desirable program cannot be undertaken without additional medical, nursing, and social work personnel, as well as increased clinic facilities. Present facilities are inadequate, even for ordinary diagnostic work, in most parts of the United States.

It is society's duty to provide these resources at the earliest possible moment.

Herman E. Hilleboe,
Assistant Surgeon General,
Associate Chief, Bureau of State Services.

MEDICAL SOCIAL SERVICE IN TUBERCULOSIS CONTROL [1]

Medical social service is a special field within the social work profession. It has developed over the past 40 years in relation to the practice of medicine in hospitals, clinics, departments of public health, and other organized programs of medical care. A broad concept of medical care has long included treatment not only of physical illness but also of those social factors which influence the effectiveness of medical care, contribute to the degree and duration of the disability, and help determine the ultimate adjustment of the individual. There is an increasing emphasis in medical practice on the preventive approach and on the social and community aspects of health.

The functions of the medical social worker are:

1. To practice medical social case work—

a. Through study of social, economic, and emotional factors which reveal the patient's readiness and ability to carry out the recommendations for medical care;

b. Through evaluation of these factors as they affect the capacity of the patient and his family to adjust to the medical situation;

c. Through dealing with social, economic, and emotional factors which may affect the patient's ability to gain full benefits of medical care and reach the best possible state of health and well-being.

2. To serve as medical social consultant, bringing to cooperating health agencies an increased knowledge of the social aspects, and to welfare agencies an interpretation of the significance, of illness and medical treatment as these affect plans of medical and social care.

3. To participate in community planning for health and welfare.

4. To share with other staff members of the health agency responsibility for participation in the orientation and in-service training programs for professional personnel.

5. To participate in the education and training of students in schools of medicine, public health, nursing, and social work, and to supervise medical social students assigned to the agency for field work practice.

6. To participate in research concerned with understanding the relationship of economic, social, and emotional factors to ill health.

The medical social worker is qualified to render these services because of the knowledge and skill developed through specialized professional education and experience. Schools of social work with approved medical social curricula require two postgraduate years of professional education leading to the degree of master of arts.[2]

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[1] From the Medical Social Unit, Office of the Chief, Tuberculosis Control Division. This article is a redaction of Medical Social Service in Tuberculosis Control, Miscellaneous Publication 37, United States Public Health Service, Government Printing Office, Washington, D. C. (1946).

[2] Eighteen of the forty-five member schools of the American Association of Schools of Social Work have an approved medical social curriculum. Because of the urgent need for trained personnel, scholarships for the required graduate training are available through grant-in-aid funds.

The medical social worker's knowledge regarding health and disease, her understanding of the role of the emotions and the meaning of behavior in illness, her understanding of the relationship and influence of economic and social factors on ill health and disability, and her ability to utilize the services of those community resources best suited to the needs of the particular individual and his family are all basic in dealing with social problems related to illness.

Under the leadership of the physician, the medical social worker functions in continuous association with the other professional personnel in the medical and health agency. She is a member of a team composed of the doctor, the nurse, the nutritionist, and others concerned with the care of the sick. Responsibility for recognizing and considering the social aspects of illness is shared by all members of the team, but the medical social worker has the primary responsibility in this respect because of her specialized training and experience. She can give help to other staff members by increasing their understanding of social factors which affect the medical, nursing, or other care which is their primary concern.

In the field of tuberculosis control, the functions of the medical social worker are those previously described. The specific methods, as related to the problem of tuberculosis, are discussed in the following pages.

EVALUATION OF THE PROBLEM

The medical social worker recognizes, as a first step in tuberculosis control, the importance of determining the extent of the problem in a community. Such an evaluation is made from all available information. The contribution of the medical social worker is to bring out the social significance of the problem by adding specific information concerning personal situations and community problems revealed through case work. The way in which contributions are made can be shown by examples:

An index of the per capita income of a State does not show the financial position of a particular family, but the medical social worker may be able to do so, as a result of personal contact.

Figures that show the availability of beds in a State do not point out for a given area the relation of beds to need, nor do they show how the beds are distributed. The medical social worker, through contact with individual patients, can add to the social interpretation of State data.

A mere statement of the number of beds in an institution does not give an accurate picture of the adequacy of a given program; but the medical social worker, through frequent experiences with patients,

can offer revealing information concerning the adequacy of medical care, the existence or nonexistence of discriminatory practices, or the quality of the food.

She may be able to point out the need for new medical and social services in a community. Various groups concerned with helping tuberculous patients and their families can use the data collected by the medical social worker as a basis for increasing the resources of a community, such as relief grants and foster-home programs for children.

RESEARCH AND HEALTH EDUCATION

Effective preventive and remedial methods in tuberculosis control are constantly improved through research and strengthened by health education. Both activities are found in other areas of tuberculosis control: case finding; medical care; isolation and aftercare; rehabilitation; and relief from economic distress.

Research.—The medical social worker can aid in research related to medical care and community health. Her work would include medical social studies of (1) intake policies of sanatoria, (2) underlying reasons why tuberculous patients leave sanatoria against medical advice, (3) problems of the tuberculous transient, and (4) economic, social, and emotional insecurity which may contribute to the reactivation of tuberculosis. Some typical locales for such studies would be health agencies where medical social service is a part of the program; research departments of health, welfare, and other social agencies; and graduate schools of social work.

Health education.—The medical social worker has no primary responsibility in health education, but rather she enables the patient to utilize its benefits. In her daily practice, she gains insight into the patient's pattern of attitudes and possible resistance to recommendations. She may observe inadequacies in home sanitation and the failure of patients to take advantage of community health facilities.

CASE FINDING

Case finding has been defined as a program of mass and individual examinations for discovering unsuspected tuberculosis. The settings in which the studies are made vary and, to some extent, determine the role of the medical social worker. The examining agent may be a private physician, or the personnel of a health department, tuberculosis association, clinic, etc. Case finding is a primary function of the public health nurse. The medical social worker, however, contributes to this activity when referrals are made to her by the nurse for intensive study or on a consultant basis when potential sources of infection

resist examination. Specifically, the functions of the medical social worker in a case-finding program are as follows:

1. To assist the physician and public health nurse *on referral*, in problems of follow-up, and in bringing in contacts.
2. To evaluate attitudes, social complications, and other factors that affect adversely the patient's ability or readiness to follow recommendations for diagnosis or treatment.
3. To help the patient to work through his difficulties and to utilize resources for meeting his needs.

In agencies where no medical social worker is yet on the staff, the public health nurse will assume, to some extent, the medical social activities. In other agencies, such as voluntary hospitals, no public health nurse may be available, and the medical social worker will extend her services to include interpretation of medical recommendations, health education, and follow-up, in addition to her case-work functions. Because of limitations of personnel in both groups, public health nurses and medical social workers will have to continue to assume some of each other's activities. In general, however, each will recognize the activities which, by education and experience, are the valid function of the other. A statement which will clarify the division of responsibility in tuberculosis control is being drawn up jointly by representatives of the National Organization for Public Health Nursing and the American Association of Medical Social Workers.

The success of a case-finding program depends upon efficient case holding. The medical social worker's contribution is increased if she is called in at the time of diagnosis, and the effectiveness of her work is often determined by the frequency with which she is consulted. Some specific social and emotional problems of patients are discussed in the following section.

MEDICAL CARE, ISOLATION, AND AFTERCARE

Tuberculosis is a disease in which body and mind must be treated simultaneously. The medical social worker helps the physician and the nurse to understand the patient as a person, in terms of his total needs and those of his family, so that a well-rounded plan can be made which will insure maximum benefits from medical care.

A. *Problems of the tuberculous patient.*

Emotional.—The problems most frequently encountered in the tuberculous patient, and those which demand the most skillful handling on the part of the medical social worker, are emotional. The diagnosis is often a great shock to the patient, and the reaction may not diminish as medical care is given. Medical treatment and isolation from the family may contribute fears that aggravate his condition.

Fear patterns may be complicated by cultural patterns and unsound advice of relatives and friends. Some frequent fears and anxieties are as follows:

1. *Fear of the disease.*—Its ultimate outcome; the possibility of death; the treatment administered, particularly surgery and its disabling effects; the danger of becoming physically, economically, and emotionally impotent and dependent; the cost of long-time medical care; stigma, and the realization that other members of the family may have become infected; inability to accept the prescribed medical regime which requires restriction of activity, removal from all close associates, loss of privacy, and submission to a medical authority.
2. *Social fears.*—Loss of status in the home and in the community as a wage earner or career person; fear of the inability to maintain the home with regard to finances, and care and supervision of the children; marital infidelity and the complicated problem of sexual relationships, including the possible inadvisability of having children; loneliness and boredom.

Economic.—Economic needs are major factors in the emotional distress of the patient. Because of the magnitude of this problem, it is discussed in a separate section, "Protection of the Tuberculous Family Against Economic Distress."

Social.—Social problems are difficult to isolate from the foregoing, since all have social aspects. For purposes of this discussion, however, the term refers to environmental problems of the patient, or more specifically, to family and legal problems. These problems are, briefly:

1. *Family problems.*—These may result from attitudes of the family toward the patient, or may arise in regard to the care of children. Housing has significance, and may be a factor in the spread and progress of tuberculosis. Visits to and by the patient frequently involve activity on the part of the medical social worker, and she must plan with family and patient so that the latter may return to a favorable environment when discharged.
2. *Legal problems.*—These are often caused by nonresidents not being accepted for care in many communities, and by conflict between the patient's desires and the welfare of others.

B. *Functions of medical social service.*

The medical social worker can give two types of service:

1. Consultation service to professional persons assisting the patient.
2. Direct case-work service to the patient.

In either type, the medical social worker will have related responsibilities of administration, education, community organization, and social action.

In health departments.—Many medical social workers on the staffs of State and district health departments are called "consultants," a term descriptive of their primary function. As specialists in social problems related to health and medical care, they provide consultant service, on individual and community problems, to all workers, in-

cluding social workers and public health nurses. Through liaison activities with social agencies, they strengthen the integration of health and welfare services. They may also interview patients and their families in health department clinics. In communities which do not yet provide the needed social service, the medical social consultant may provide it herself, as a temporary measure. Through interpretive conferences with public health nurses and supervisory workers in welfare agencies, she may help the patient to obtain additional care.

The medical social consultant's services are being utilized increasingly by public health nurses in group discussions and individual conferences. By request of the public health nurse, the consultant visits a family; nurse and consultant then decide on the next step—whether the nurse shall carry the responsibility alone, whether the consultant shall continue to assist the nurse by consultation or direct service to the patient, or whether the nurse and a local social agency shall give the service. In a social situation the members of a medical team must agree, by conference, on the responsibility that each will carry. The medical social consultant in a tuberculosis-control program in State health agencies will work cooperatively with other medical social consultants, so that all the social services will be closely correlated.

In tuberculosis clinics.—In a public health clinic, the medical social worker can serve as consultant or, by agreement with the physician and the public health nurse, can assume a direct case-work responsibility. Generally, her major function will be to discover, evaluate, and assist in the solution of problems, emotional, economic, and social, which hinder the patient's adjustment. Specifically, she will assist by dealing with the patient's attitude toward diagnosis and treatment; by determining his eligibility for treatment resources and interpreting procedures and policies; by helping him and his family to work through any social complications that interfere with his medical care; and by establishing a supportive relationship which will help to sustain the patient and his family throughout the period of care.

Additional functions with regard to patients discharged from the sanatorium are: to reevaluate the social situation in light of the patient's medical needs, revealing current factors and trends; to inform physician and nurse of changes in the patient's social situation; to learn of changes in medical status, for the purpose of joint planning; and to assist the physician and nurse in helping the patient and his family to understand his condition, so that there will be neither overprotection nor excessive demands.

Referral of a patient to the medical social worker is possible at any

time, but serious social problems can be prevented if she is called at the time of diagnosis. After a complete study of the patient's problem, the medical team determines the division of responsibility for further service. In order to avoid overlapping functions and activities of the medical social worker and the public health nurse, reasons for referral should be studied and clearly stated. The physician is responsible for the total plan of medical care, but the plan between public health nurse and medical social worker may follow one of three patterns:

1. When the health problem is paramount, the public health nurse should carry the major responsibility, and the medical social worker should serve as consultant for the social aspects of service;
2. When the social problem is of major proportions, responsibility for social study and care should be assigned to the medical social worker; and
3. A problem with serious health and social aspects, calling for the special skills of nurse and medical social worker, should be handled cooperatively.

In the tuberculosis sanatorium.—The day-to-day life of the patient in a sanatorium can produce much strain and tension. The medical social worker can be of assistance in such problems as personality conflicts, fears, superstitions, the need to repress sexual desires, and refusal of treatment. In order to carry the responsibilities, an adequate number of medical social workers are needed—at least 1 for every 50 to 75 patients. At the time of the patient's admission to the sanatorium, the physician may use the medical social worker in two ways: (1) to assist the patient in making adjustments, and (2) to make a social evaluation of all new cases. To avoid crises, such as leaving the sanatorium against advice, the physician should ask the medical social worker's help in discovering and dealing with the emotional, economic, and social problems of the patient.

In addition to referrals from the physicians, the medical social worker may receive requests for services from patients, patients' families, other staff members, and interested agencies. She will evaluate each situation, with respect to the patient's need for her services, in the following manner: (1) patients for whom no service is indicated at the present, (2) patients for whom temporary service is indicated, and (3) patients for whom extended service is required. In order to synchronize the activities of the medical team, a weekly staff conference is recommended, to reevaluate patients' problems, to analyze the medical-social needs of new patients, and to determine the readiness of patients to be referred to vocational counselors.

REHABILITATION

Rehabilitation is an integral part of the treatment of the tuberculous patient. Its goal is the restoration of the patient to the fullest possible physical, mental, emotional, social, vocational, and economic

usefulness of which he is capable. The process of rehabilitation begins at the time of diagnosis and is continuous throughout medical care.

Rehabilitation requires teamwork in which several professions take part, but not necessarily at the same time. The leader is the physician, and all other services are based on his diagnosis and recommendations. Among the members of the team are the nurse, medical social worker, occupational therapist, rehabilitation counselor, and teacher. At times, representatives of outside agencies may participate. The medical social worker, an essential member, assumes responsibility for the social aspects of service.

A. *Social, emotional, and economic aspects of rehabilitation.*

All the social services previously discussed in relation to the social, emotional, and economic needs of the patient may be given by the medical social worker as part of the rehabilitation process. Her share in the process includes help with social aspects of problems that retard recovery and block rehabilitation. She can prepare the patient for vocational referral by interpreting services, and can utilize community resources to overcome financial and social difficulties. Understanding the patient's fear of losing status, she may help him to accept a job that is less satisfying economically and socially than his former one. She can assist with follow-up problems resulting from unhealthful attitudes or other complications.

The after-care period has been considered to include the first 6 years after discharge. Some of the anxieties and fears that occur at the time of diagnosis and during the sanatorium period may carry over into the postsanatorium period, with added anxieties concerning the attitudes of family or employer.

B. *Vocational aspects of rehabilitation.*

Decisions with regard to vocational referral are dependent on many factors requiring joint consideration by the team. A staff conference, led by the physician, enables each member of the team to make his particular contribution. The medical social worker contributes by bringing to the other members the information that she has gained from the patient regarding his attitudes, family, background, and interests. She is in a position to know which patients are ready, socially and emotionally, for vocational service.

Those who plan rehabilitation services are confronted with two major problems: the attitude of industry toward employment of tuberculous patients, and the complications arising from the policies of insurance companies. The solution is not within the scope of medical social service. The medical social worker, however, may

be able to assist by explaining the patient's situation to employers and others. There are hopeful signs that employers and the United States Employment Service will join with health officials and others to find an answer to the employment needs of the tuberculous.

Rehabilitation service must provide the fullest possible life in terms of physical and mental health, occupation, and society. The human and economic waste that results when the benefits of sanatorium care are nullified by inadequate rehabilitation services cannot be overemphasized. Every tuberculous patient restored to his place in society adds to the continuity of family life and enriches the community. The success of rehabilitation services provides a new measure of the effectiveness of tuberculosis control programs.

PROTECTION OF THE TUBERCULOUS PATIENT AND HIS FAMILY AGAINST ECONOMIC DISTRESS

Indigenous to the problem of tuberculosis are economic problems, which may contribute to produce the disease or may arise from it. Inadequate food, poor living conditions, and constant emotional strain are debilitating, and may contribute to the incidence of tuberculosis. On the other hand, loss of earning power, as a result of tuberculosis, may affect adversely the patient and his family, creating a financial drain on the community. Tuberculosis is especially prevalent in the age group that is most economically productive.

When tuberculosis strikes the average family, financial aid from the outside is usually needed, especially if the disease strikes the wage earner. Some of the general economic problems of the tuberculous patient are loss of income, cost of lengthy and expensive medical care, the burden of providing for children in the absence of the mother, and the loss of assets, such as homes, businesses, insurance, and savings. To neglect these problems is to neglect treatment.

The resources for medical care in tuberculosis vary markedly among States and communities. Only a few areas have met this problem with any degree of effectiveness. Present inadequacies in medical care include an insufficient number of beds, an absence of free diagnosis and treatment in many communities, and restrictive requirements as to residence and race. These inadequacies, combined with such dubious administrative techniques as the means test, form a concrete barrier to effective tuberculosis control.

In the United States, the three accepted patterns of financial aid are public assistance, general relief, and social insurance. Funds for public assistance usually come from Federal grants-in-aid, matched by State funds; general relief funds may come from State or local sources; and social insurance, unfortunately, does not provide for persons disabled by illness. A national disability insurance program

is the only satisfactory answer to the total economic problem of the tuberculous.

The medical social worker, through consultant or direct case-work service, can gather evidence of the patient's economic position; and interested groups may use these data in securing remedial social action for adequate economic protection. For the patient and family with economic problems, the medical social worker can provide direct assistance by helping them to work out a plan of medical care within their means. She can help them to make applications for public assistance, general relief, or other financial aid, and can offer a liaison service between agencies concerned with helping them. She can arrange employment of an assistant in the home, furnish transportation to and from the sanatorium, and assure enough visitors to maintain morale.

The medical social worker functions in relation to other social agencies. Her activity consists in helping the patient to choose the appropriate resource to meet his needs, preparing the patient and the agency for the referral, and in assisting the health and welfare agencies to work out a division of cooperative responsibility to the patient.

In spite of individual or combined efforts, the present inadequacies in public assistance, general relief, and social insurance often preclude a sound plan for the patient, his family, and the community. Measures most often advocated to relieve this situation are grants-in-aid for the tuberculous as a group, Federal disability insurance, or a combination of both. Medical social workers have an important contribution to make toward broader social planning, and they can effectively help in the social action necessary to bring such plans into being. Because of the essential relation between tuberculosis and economic insecurity, effective tuberculosis control cannot be achieved so long as society fails to provide adequate economic security for the disabled.

THE EVOLUTION OF OFFICIAL TUBERCULOSIS CONTROL IN THE UNITED STATES [1]

By Robert G. Paterson, *Secretary, Committee on Archives, National Tuberculosis Association*

In reviewing the evolution of the official tuberculosis control program in the United States, one question constantly arises:

Why did it take so long to establish official participation?

Beginning with the first organization of an unofficial tuberculosis association, The Pennsylvania Society for the Prevention of Tuber-

[1] From the Office of the Chief, Tuberculosis Control Division, Bureau of State Services, U. S. Public Health Service.

culosis (*1*) established by Dr. Lawrence F. Flick in 1892, and culminating in the official Tuberculosis Control Division of the United States Public Health Service (*2*) in 1944, the time required was 52 years.

Between these two dates, 1892 and 1944, many changes were made in the approach to the tuberculosis problem. Throughout this period, conflict can be sensed between the medical and the social approaches, the private as opposed to the public handling of the problem, and the philosophy of the local as against the central control of the disease. These conflicts are inherent in the tuberculosis movement in the United States. Moreover, they contain the answer to our question.

From 1882, when Koch (*3*) announced his discovery of the tubercle bacillus, to 1892, when Flick organized the Pennsylvania Society, there is discernible the struggle to establish the concept of "the contagiousness of consumption" as against the generally accepted idea of hereditary transmission of the disease. Accompanying this effort, attempts were made to educate the public concerning the nature of the disease. An effort made by Dr. Herman M. Biggs (*4*) in New York City in 1889 marks the first real attempt to establish public administrative control of tuberculosis.

Tuberculosis workers have a tendency to mark the beginning of the organized efforts against tuberculosis with the formation of the National Tuberculosis Association (*5*) in 1904. Yet there is ample evidence (*6*) that this date merely signifies the compromises among a number of conflicting medical concepts and groups of workers. These conflicting medical concepts concerned therapeutics, pathology, and diagnosis. Many of the concepts came from ancient times. For example, the ideas of the therapeutic value of sea voyages and of residence in or near woods that abound in pine or balsam go back to Hippocratic medicine. Then came the idea of change of climate. Rush advocated especially "a dry situation, the higher and drier for the purpose, the better." Together with this notion was advanced that of horse-back riding, which took the patient out in the air.

What is known today as the "open-air treatment" stems from George Bodington, who in 1840 wrote "an Essay on the Treatment and Cure of Pulmonary Consumption." The practical application of Bodington's belief was first made by Hermann Brehmer in 1859 at Goerbersdorf in Silesia. Eight years later, in 1867, Peter Dettweiler founded his sanatorium at Falkenstein, near Frankfort, Germany, at an altitude of 1,300 feet. He added the "rest-cure" to the "open-air cure" of Brehmer.

In the United States, the first private sanatorium was erected in 1875 by Dr. J. W. Gleitzmann. It was located in Asheville, N. C.

The first sanatorium for the poor was established by Edward Livingston Trudeau at Saranac Lake in 1884. It was known as the Adirondack Cottage Sanatorium. The first municipal sanatorium was erected in 1897 at Cincinnati, Ohio. The first State sanatorium was established by Massachusetts and was opened at Rutland, October 1, 1898.

In 1887, the first tuberculosis dispensary in the world was opened in Edinburgh, Scotland, by Dr. Robert W. Philip. This dispensary had for its objectives the reception and examination of patients; the instruction and guidance of patients, their families, and friends; the dispensing of necessary medicines; visits in homes of the tuberculous; and the selection of patients for hospital treatment.

In the United States, the first such dispensary was established at Philadelphia in 1891 by Rush Hospital for Consumption and Allied Diseases. Dr. John H. Huddleston organized the first tuberculosis dispensary under municipal auspices at Gouverneur Hospital in New York City in 1903.

In 1895, Roentgen of Wurtzburg, Germany, discovered a certain ray of light that can penetrate opaque objects, and can reveal in shadows what is hidden from the eye. The X-ray made possible the examination of bodies to determine their physical structure, and disclosed the physical alterations brought about in the lungs by the invasion of tubercle bacilli. Here was the discovery of a reliable means of diagnosis and of gaining information relative to the treatment of pulmonary tuberculosis. Today, the X-ray is a major instrument in the early diagnosis of the disease, on both an individual and a mass basis.

The social aspects of the problem began to emerge about 1902. Organization of the Committee on Tuberculosis of the New York City Charity Organization Society introduced a new element into the tuberculosis movement. This new element was the election of a layman as secretary of the committee. The significance of this action was to place emphasis upon the social implications of tuberculosis.

From these beginnings, interest in the tuberculosis program increased among the members of the medical profession and among persons especially interested in philanthropy. Before the formation of the National Tuberculosis Association in 1904 (*6*), several attempts were made to organize a tuberculosis movement on a national scale. In all of these efforts, the conflict between the private medical support for *treatment* and the public health belief in *prevention* is sharply defined.

When the National Tuberculosis Association was formed on June 6, 1904, at Atlantic City, these conflicting viewpoints were contending for supremacy. The results of decisions at this historic meeting are

evident today. The decision to include both treatment and prevention in the objectives of the association was fundamental. This meant close teamwork between the medical profession and the public. Interpreted in the light of present-day efforts, this decision has made it clear that the official agencies for the control of tuberculosis can never afford to act without the approval of public opinion.

Another important decision was the general acceptance of the idea of retaining the movement under private control. At the time, there was a widespread distrust, if not contempt, for the so-called official public health authorities, local, State, and national. Most of them were regarded as political appointees and were not esteemed by the medical profession.

That the conflicting concepts, the treatment and prevention of tuberculosis, and the private control of the movement, were firmly rooted in the tuberculosis program was demonstrated in 1912. In that year, in Ohio, discussion came up concerning the establishment of a Division of Tuberculosis in the State Board of Health. Leaders in the National Tuberculosis Association were fearful of such a proposal on three grounds. It was feared, first, that such a step would throw the tuberculosis movement into politics; second, that professional personnel requirements in State Boards of Health were nonexistent, or on such a low plane that little or no help would accrue to the movement; and third, that the creation of such an official agency would constitute a threat to private tuberculosis control activities.

After the establishment of the Division of Tuberculosis under the Ohio State Board of Health in May, 1913, however, the National Tuberculosis Association began to discuss the place of local and State health departments in the tuberculosis movement (*7, 8*). In 1917, a special committee on expenditures of Red Cross Seal funds recommended "securing the establishment in State or local health departments of divisions of tuberculosis, or of definitely organized tuberculosis activity, for the promotion of all forms of antituberculosis work" (*9*). During the same year, a Committee on Federal Legislation reported on the Kent Bill, which was amended to provide for a division of tuberculosis in the United States Public Health Service, but the bill failed to pass. Similar bills (S. 1597, Senator Ramsdell, and H. R. 3666, Mrs. Rayburn) were introduced in the next session of Congress, but they, too, failed to pass (*10*).

Gradually, it was recognized that certain parts of the tuberculosis program should be under official control. It became clear that the tuberculosis program was too important and far-reaching for private effort and finance to carry on alone. General acceptance of official

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responsibility for sanatoria, clinics, nursing services, case finding, and certain phases of health education can be observed in the evolution of the tuberculosis program, but developments of these opinions were uneven throughout the Nation. Private tuberculosis organizations were reluctant to give up the programs they had initiated.

World War I gave impetus to the recognition of the need for governmental participation in the control of tuberculosis. In 1919, the National Tuberculosis Association adopted a resolution urging the establishment of a division of tuberculosis in the United States Public Health Service. But no effective steps were taken to implement the idea. A deep-seated reluctance to yield private control of the movement continued.

Between World War I and World War II, an unprecedented migration of population took place in the United States. This migration became a problem in tuberculosis hospitalization and brought about agitation for Federal aid in meeting hospital costs for nonresident cases of the disease. A resolution urging increased effort in the control of tuberculosis by official agencies was passed by the National Tuberculosis Association.

With the advent of World War II, the fluidity of the population increased to such an extent that in 1943 the National Tuberculosis Association was led to appoint a War Emergency Committee to consider what changes, if any, should be recommended in the program of the association. Discussion of the problem of hospital care for migratory tuberculous patients was prominent on the agenda.

In the meantime, Surgeon General Parran had taken steps for the United States Public Health Service to engage actively in the tuberculosis control program (*11*). Soon after Pearl Harbor, he established a small tuberculosis control section in the States Relations Divison of the Bureau of State Services.

Throughout 1943 and in early 1944, in and out of Congress, agitation continued for more extended activities for control of tuberculosis. The War Emergency Committee of the National Tuberculosis Association recommended over-all participation in the tuberculosis control program by the United States Public Health Service. This recommendation was given force by a mass health-education campaign carried on by every State tuberculosis association under the leadership of the National Tuberculosis Association. Early in 1944, a comprehensive health bill was introduced in the Congress by Representative Bulwinkle of North Carolina and Senator Thomas of Utah. Congress acted affirmatively, and the Tuberculosis Control Division of the United States Public Health Service was established on July 1, 1944.

In brief, this is the story of the long road traveled by the tuberculosis movement to secure official governmental support, local, State, and Federal. Adjustments in the programs of public and private agencies had to be made after each advance. Gradually, widespread agreement was reached on the activities which belonged properly to the official agencies; these decisions were released from time to time by the unofficial tuberculosis organizations. Today, further adjustments are being made so that the reciprocal functions of official and unofficial agencies may reach their most effective spheres of action.

At the moment, the generally accepted thesis appears to be that the unofficial tuberculosis organizations perform their most enduring functions in experimentation, demonstration, legislation, and education. But fundamentally all these functions are directed toward the building of adequate public support for official tuberculosis control. To achieve this goal, there is need for a common understanding of the origins of the specific items included in the official program.

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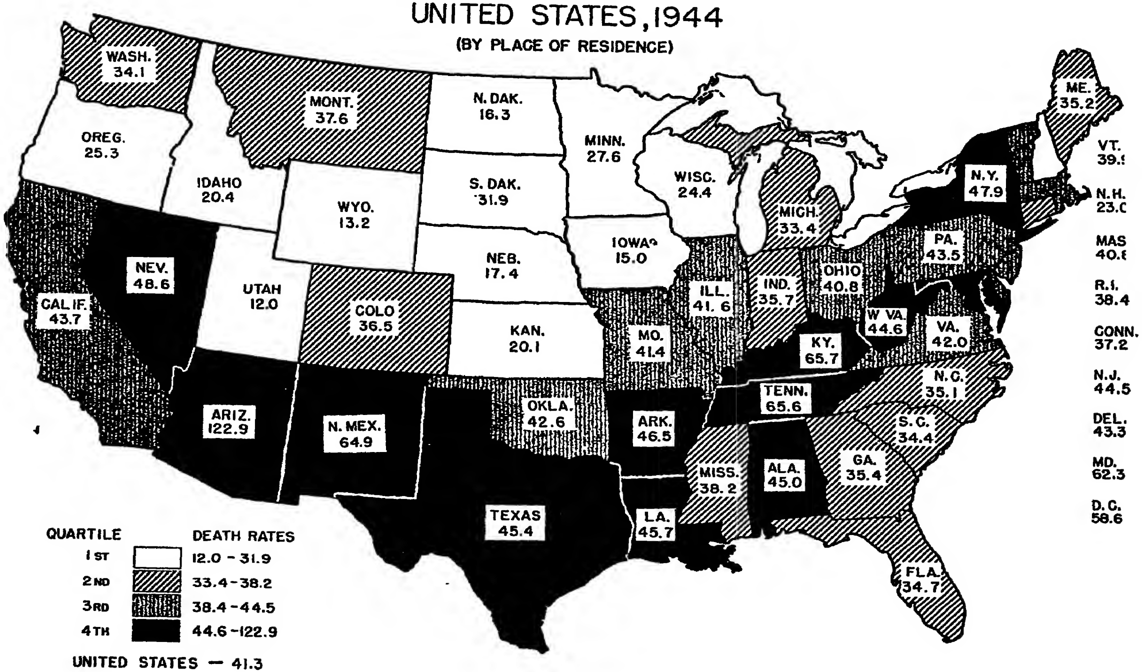
TUBERCULOSIS (ALL FORMS) DEATH RATES PER 100,000 POPULATION
UNITED STATES, 1944
(BY PLACE OF RESIDENCE)



SOURCE: Public Health Reports, Vol 61 #

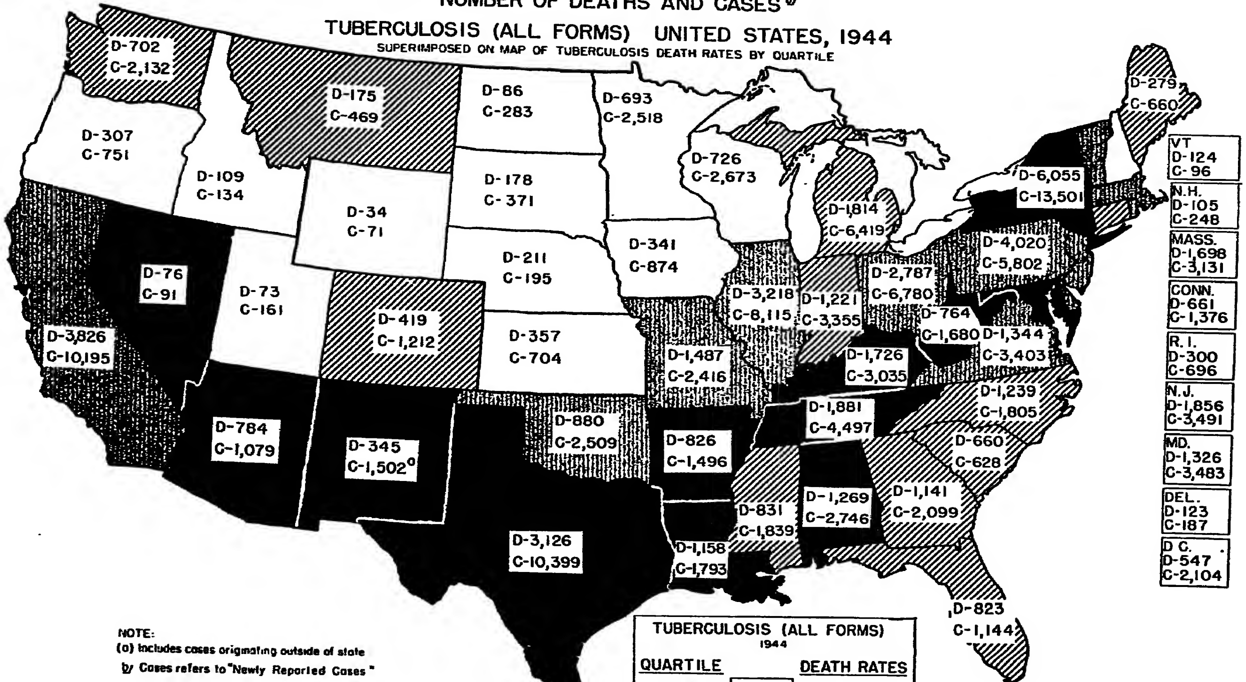
SERIES 1944 - A

Federal Security Agency
U S. PUBLIC HEALTH SERVICE
Tuberculosis Control Division

NUMBER OF DEATHS AND CASES[b]

TUBERCULOSIS (ALL FORMS) UNITED STATES, 1944

SUPERIMPOSED ON MAP OF TUBERCULOSIS DEATH RATES BY QUARTILE



NOTE:
(a) Includes cases originating outside of state
b/ Cases refers to "Newly Reported Cases"

TOTAL U.S. – DEATHS-54,731
CASES-126,348

TUBERCULOSIS (ALL FORMS)
1944

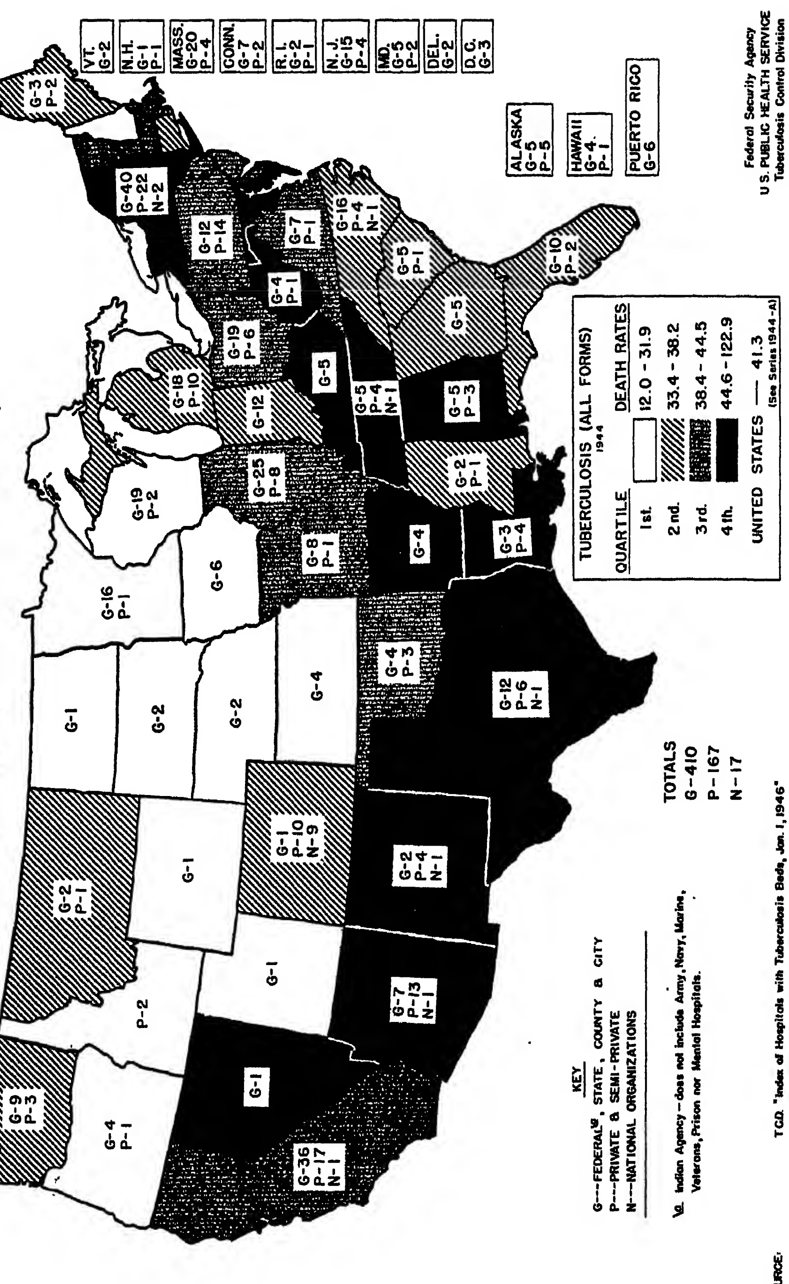
QUARTILE		DEATH RATES
1st.	(blank)	12.0 - 31.9
2nd.	(hatched)	33.4 - 38.2
3rd.	(stippled)	38.4 - 44.5
4th.	(black)	44.6 - 122.9
UNITED STATES		— 41.3

(See Series 1944-A)

SOURCE: Public Health Report, Vol 61#14 & Vol 60#12

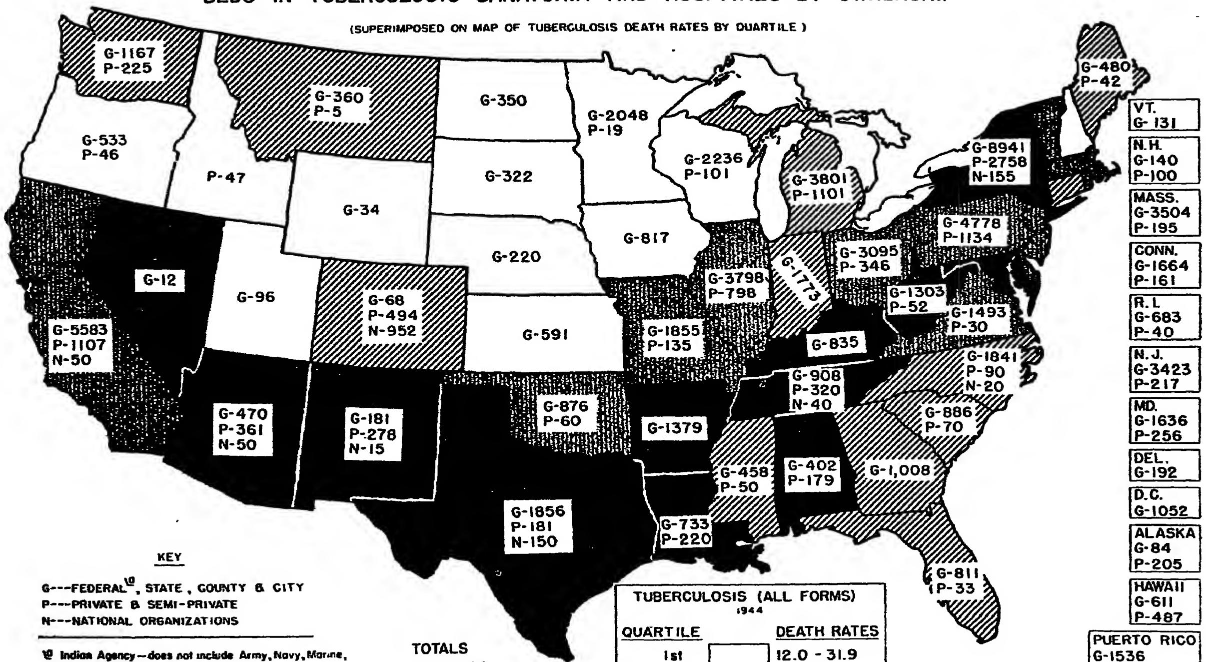
Federal Security Agency
U S PUBLIC HEALTH SERVICE
Tuberculosis Control Division

OWNERSHIP OF TUBERCULOSIS SANATORIA AND HOSPITALS.
(SUPERIMPOSED ON MAP OF TUBERCULOSIS DEATH RATES BY QUARTILE.)



BEDS IN TUBERCULOSIS SANATORIA AND HOSPITALS BY OWNERSHIP

(SUPERIMPOSED ON MAP OF TUBERCULOSIS DEATH RATES BY QUARTILE)



KEY

G---FEDERAL[1], STATE, COUNTY & CITY
P---PRIVATE & SEMI-PRIVATE
N---NATIONAL ORGANIZATIONS

[1] Indian Agency—does not include Army, Navy, Marine, Veterans, Prison nor Mental Hospitals

TOTALS
G-73,054
P-11,943
N- 1,432

TUBERCULOSIS (ALL FORMS)
1944

QUARTILE	DEATH RATES
1st	12.0 - 31.9
2nd	33.4 - 38.2
3rd.	38.4 - 44.5
4th.	44.6 - 122.9

UNITED STATES — 41.3
(See Series 1944-A)

Federal Security Agency
U S PUBLIC HEALTH SERVICE
Tuberculosis Control Division

SOURCE T C D. "Index of Hospitals with Tuberculosis Beds, Jan 1, 1946"

SKIN REACTIONS TO TUBERCULIN*

An article by P. Hauduroy [1] on "tuberculins and tuberculin reactions" refers to Calmette's reports of the very unequal experimental values of various commercial tuberculins, and discusses the work of the Danish School in the preparation of standardized tuberculin and standard skin tests which made possible comparable epidemiological statistics. . The "tuberculin unit" corresponds to 1/100 mg. of old tuberculin supplied by the State Serum Institute of Copenhagen. The intracutaneous test, up to 1 mg. if necessary, is replacing the skin test, and is becoming standard (Madsen, Holm, and Jensen). . . .

M. Lelong and A. Maclouf [2] have studied the reactions of 12,530 Parisian children to tuberculin. These figures are definitely regressive in comparison with those of an analogous study made ten years ago in the same office by P. Lereboullet, H. Gavois, and Baussan. Male children are more frequently allergic than females. . . .

P. Braun and A. Maclouf [3] discuss our knowledge of latent carriers of tubercle bacilli who do not react to tuberculin.

Late spontaneous inversion of skin reactions which have remained negative during the usual waiting period is illustrated by new observations. Bernheim and Jeune [4] have observed inversion after a percutaneous reaction.

B. Kreis, L. Barre, Martinet, and Mlle. Renault [5] have studied the variations of allergy in the tuberculosis cycle, as a function of stages of infection on one hand and of lesional types on the other.

REPORT OF A CONFERENCE ON BCG VACCINATION [1]

On September 7, 1946, a conference on BCG vaccination was held in the offices of the Tuberculosis Control Division of the United States Public Health Service in Washington, D. C. The members attending the conference were:

Dr. Burns Amberson, College of Physicians and Surgeons, Columbia University, New York.

Dr. Joseph Aronson, Henry Phipps Institute, Philadelphia.

Dr. Howard Bosworth, Barlow Sanatorium, Los Angeles.

Dr. Charles Doan, College of Medicine, Ohio State University, Columbus, Ohio.

Dr. Johannes Holm, State Serum Institute, Copenhagen, Denmark.

Dr. Esmond Long, Henry Phipps Institute, Philadelphia.

Dr. Jay A. Myers, University of Minnesota, Minneapolis.

*This is a summary of articles from—

1 Presse Medicale, No. 2:13 (January 13, 1945).

2 Presse Medicale, No. 25:337 (June 23, 1945).

3 Soc. Pathol. comp. (February 13, 1945).

4 Soc. med. des hop. de Lyon (January 9, 1945).

5 Soc. d'est. scient. sur la tub. (March 10, 1945).

1 From the Office of the Chief, Tuberculosis Control Division, Bureau of State Services, U. S. Public Health Service.

Dr. David T. Smith, Duke University, Durham, N. C.

Dr. Henry Stuart Willis, William H. Maybury Sanatorium, Northville, Mich.

Dr. I. C. Yuan, National Institute of Health, Nanking, China.

The United States Public Health Service was represented by Dr. Herman E. Hilleboe, Dr. Francis J. Weber, and Dr. Carroll E. Palmer of the Tuberculosis Control Division, Bureau of State Services; and Dr. Milton V. Veldee, Biologics Control Laboratory of the National Institute of Health.

A brief review of the past experience with BCG vaccination was presented by Dr. Hilleboe, with detailed discussion of the work in South America.

The development of a particular strain of bovine tubercle bacilli which had lost its virulence was announced in 1908 by Calmette and Guerin in Paris; 12 years later they reported that this BCG culture was harmless to man. Since the work of Calmette and Guerin, considerable interest has been shown throughout the world in the use of artificial immunization for protection against tuberculosis.

Two methods of application are possible: First, the use of dead bacilli; second, injection of strains of living bacilli which do not have the power to cause progressive disease. Of the two methods the second has been used more extensively. Several million vaccinations have been performed since the first work with human beings was done by Calmette and Guerin in 1921. Although extensive vaccinations have been carried out in Europe and South America, and careful studies undertaken in the United States, BCG vaccination has not been widely accepted in this country.

During the conference, the studies of Dr. Aronson and his coworkers were presented by Dr. Aronson and discussed by Dr. Carroll E. Palmer, who assisted in the analysis of these data.

Dr. Johannes Holm presented his investigations and those of his co-workers, which have been carried on since 1930 in Denmark. After a detailed discussion of the material presented by Dr. Aronson and Dr. Holm, there was a general discussion of the entire problem of BCG vaccination, including the experimental work done on the relationship between allergy and immunity in tuberculosis.

Dr. Veldee presented the problems of virulence and stability of vaccine which contains live organisms. He also discussed the need for more research before commercial licensing of BCG vaccine can be considered.

As a result of these deliberations of outstanding leaders in tuberculosis in the United States, China, and Denmark, certain recommendations were made which will be used as a guide in the expansion

of the research program of the Tuberculosis Control Division of the United States Public Health Service.

It was strongly urged at the conference that BCG vaccine should not be commercially produced at present in the United States. Extensive investigations are indicated before commercial distribution can be considered. After a detailed review of the literature and the presentation of papers by the members of the conference, it was concluded that BCG vaccination appears to confer increased resistance to tuberculosis for the period covered in the studies. At present, however, information is incomplete as to the amount of this resistance or its duration. Furthermore, these studies as yet do not answer the question of the long-time effect of BCG vaccination on aging members of the population.

On the basis of a careful review of all published reports and the experience of members of the conference who have actually done vaccination, it was agreed that there have been no proved cases of progressive disease from BCG vaccination in human beings.

Vaccination of human beings with BCG vaccine can be done without causing severe local reactions at the site of injection or in the regional lymph glands, provided that proper vaccine, dosage, and method of administration be used. It was recommended that the intracutaneous method of vaccination be utilized in any studies contemplated. Further research should be done in the other methods of vaccination in an attempt to develop a technique to decrease the number of severe local reactions to the vaccine.

BCG vaccine is given only to nonreactors to tuberculin, and it was agreed that properly prepared vaccine could convert a high percentage of these nonreactors into reactors to tuberculin. There is as yet no conclusive information concerning the duration of tuberculin sensitivity which results from BCG vaccination.

In order to study the need for revaccination of those reactors who become nonreactors after vaccination, it was recommended that one study group be revaccinated and another group not be revaccinated, so that the need for revaccination might be determined.

It was recommended that a single laboratory produce BCG vaccine for the entire United States during the period of the proposed expanded study program and that this laboratory be established and supervised by the United States Public Health Service.

It was recommended that conferences be held with representatives of European, South American, and Asian countries in order to work out plans for uniform methods of producing BCG vaccine, and to make a comparison of the vaccine strains used in various countries of the world. Cooperative planning of studies should also be undertaken.

It was recommended that investigations be conducted during 1947 on certain population groups in the United States, in order to determine the effectiveness of BCG vaccine in the control of tuberculosis. Persons exposed to such a degree that they are almost certain to become infected, should be given first consideration. Particularly should we concern ourselves with the various tribes of American Indians in the United States; inmates and employees of mental institutions; employees of general hospitals and sanatoria in which the danger of infection is excessive because control measures are lacking; medical students in schools in which the services include exposure to tuberculous patients; and persons economically and socially underprivileged, among whom tuberculosis mortality is very high.

It is not recommended that the vaccine be used in areas such as Minnesota, where the incidence of tuberculosis and the percentage of tuberculin reactors is markedly low. Extensive studies in populous areas should be initiated by the Public Health Service in cooperation with local groups. It was suggested that a county or part of a State, with a population of at least 100,000 people, could be studied over a period of several years in order to determine the effect of BCG vaccination on an entire community.

It was recommended that the vaccine not be furnished to general practitioners for use in individual patients at present.[2]

CONCLUSIONS AND RECOMMENDATIONS [2]

1. BCG vaccine should not be made commercially available at present.
2. From studies presented at the conference, it appears that BCG vaccination confers increased resistance to tuberculosis for the limited period covered in these studies.
3. Medical literature fails to reveal any proved cases of progressive disease as a result of BCG vaccination.
4. BCG vaccination can be done without causing severe local reaction.
5. The intracutaneous method of vaccination is recommended for use at present.
6. In the studies presented, BCG vaccination converted a large percentage of nonreactors (to the tuberculin test) into reactors.
7. Need for revaccination and the time interval between vaccination require further study.
8. It was recommended that a single laboratory be established by the Tuberculosis Control Division to produce BCG vaccine for the

[2] The policy expressed in this announcement was approved by Surgeon General Thomas Parran on October 7, 1946.

entire United States for use in research programs proposed at the conference.

9. Extensive investigations should be carried on cooperatively with recognized research groups throughout the nation, especially in population groups highly exposed to tuberculous infection.

10. It was recommended that the Tuberculosis Control Division set up a controlled study in a community with a population of 100,000 or more, to determine immediate and long-range results.

11. Further research is strongly recommended to determine the efficiency of the vaccination and also to attemp to develop a vaccine composed of dead bacilli. It was recommended that methods be developed to standardize techniques of preparation of a potent and stable vaccine for use in the United States and, if possible, throughout the world.

A REVIEW [1] OF

A COMPARISON OF THE EFFECTIVENESS, FOR TUBERCULOSIS CASE FINDING, OF VARIOUS ROENTGENOGRAPHIC AND PHOTOFLUOROGRAPHIC METHODS

Of special interest to workers in tuberculosis control is an investigation reported by Birkelo, Chamberlain, Phelps, Schools, Zacks, and Yerushalmy in the February 8 issue of the Journal of the American Medical Association.

In 1944 the Veterans' Administration appointed a Board of Roentgenology to evaluate the diagnostic efficiency of the various sizes of films which are used in mass surveys to determine the presence or absence of pulmonary tuberculosis in large groups of the population. Neglecting such considerations as cost, ease of operation, and the like, the Board set out to investigate the effectiveness of the 35-mm. and 4″ by 10″ photofluorogram, 14″ by 17″ paper negative, and 14″ by 17″ celluloid film. The Board was requested to seek out a most efficient medium and to make proper recommendations.

The following is an abridgment of the article.

In selecting the material on which to base the study, the Board attempted to simulate as nearly as possible the conditions of mass-survey work for which these media are ordinarily utilized. Accordingly, the entire populations of two Veterans' Administration institutions were surveyed. The populations of these institutions were of three different types: (1) employees, (2) ambulatory patients of a general hospital, and (3) residents for domiciliary care.

[1] From the Office of the Chief, Tuberculosis Control Division, Bureau of State Services, U. S. Public Health Service.

A 35-mm. photofluorogram, a 4″ by 10″ stereophotofluorogram, a roentgenogram on a 14″ by 17″ paper negative, and a conventional 14″ by 17′ celluloid film were taken, within a few minutes of one another, of each person participating in the study. The companies that provided the machines made special efforts to produce films of the best possible quality. The four sets of films were interpreted independently by the five members forming the Board of Roentgenology.

Prior to reviewing any of the films, the Board convened, reached agreements on nomenclature, and developed a code for classifying the films into distinct categories in as uniform a way as possible. Members of the Board also reviewed samples of films (not included in the study) made with various techniques, and classified them independently and in conference, in an attempt to arrive at uniformity of nomenclature.

The object of the study was to obtain a measure of the efficiency of the different techniques in selecting individuals with chest disease from among the study group. Specifically, the following two measures must be obtained for each technique. First, the percentage of persons with chest disease whose films are read as negative, which might be called "under-reading" or "misses"; and second, the percentage of films called positive for persons having no chest disease. These would be "over-reading" or "false positives."

The first difficulty encountered in a study of this kind is that of distinguishing the limitations due to the media from those limitations resulting from the subjective error inherent in film interpretation. The magnitude of the latter may be appreciated from a review of the difficulties involved in obtaining an answer to the simplest and most fundamental question: How many persons in the study were positive for tuberculosis? On 1,256 films (14″ by 17″ celluloid), one reader selected 56 positives, another 100 positives, and the remaining three readers selected intermediate numbers. There were 131 films called positive by one or more readers. The number of cases called positive by a single reader using all the different media (35-mm. photofluorogram, 4″ by 10″ stereophotofluorogram, 14″ by 17″ paper negative, and 14″ by 17″ celluloid film) varied from 74 to 170. The number of cases called positive by one or more readers on all media was 262. It became apparent from the accumulation of figures in the study that the different readers, even when limited to the 14″ by 17″ celluloid films, showed great variation in their interpretations.

As an initial step, an attempt was made to measure subjective errors, which are of two types: (1) inter-individual variation, or the failure of an individual reader to be consistent with other readers in interpreting the same set of films; and (2) intra-individual variation, or the failure of a reader to be consistent with himself in two independent interpretations of the same set of films.

The study revealed that experienced radiologists and chest specialists were not consistent with one another in classifying films in the broad categories used for evidence of tuberculosis. It was even more surprising to find, in some cases, that 20 percent of the films called positive for tuberculosis by one reader were called entirely negative by another. Part of these differences could be attributed to the varied background and experience of the five readers. By no means, however, did this account for the entire variation, since each of the specialists, reading the complete set of 14″ by 17″ celluloid films for the second time, showed considerable differences in his own two independent interpretations. For example, one reader called 59 films positive for tuberculosis on his first reading and 78 positive on the second reading 1 month later, and the 78 did not include all the 59 which he called positive originally.

Because of the foregoing difficulties, it became necessary to devise a method of analysis which would reduce, as much as possible, the effect of inter- and intra-individual variations, and which would accentuate the inherent limitations of the different films—if such limitations could be proved to exist. Such a method, it was believed, could be obtained by basing the analysis on "group opinion." There are a number of valid objections to the "group opinion" interpretation when such an opinion is obtained in conference or in consultation. In this material, however, a "group opinion" was obtained by combining the independent interpretations of the individual readers.

The rationale behind this method of analysis was formulated as follows: The classification of an individual, on roentgenological evidence, as being positive or negative for tuberculosis depends not only on whether a shadow exists on his X-ray, but also upon whether the shadow is such that it can be perceived by an interpreter. In other words, if it were possible to show, by some objective measurement, that a shadow is present on an X-ray film, but that it cannot be perceived in normal reading practice, such a shadow is for all practical purposes nonexistent.

Now, if a film is called positive by only one of five competent readers and negative by the other four, it is idle to speculate on whether a lesion is really present and the four have missed it, or whether the single positive reading represents over-reading. For all practical purposes, it may be concluded that even if a lesion exists, the film is not capable of revealing it, since it escaped detection by four of the five. However, when a film is called positive by more than one reader, there is greater probability not only that the case is positive, but also that the film in question is capable of revealing the lesion. In addition, the subjective errors are greatly reduced by using more than one reader, for while a single reader may miss a positive

film, the chances that the same film will be missed by several readers, each reading independently of the others, are small.

The study, then, attempted to measure the relative diagnostic efficiency of films of different sizes. The 14″ by 17″ celluloid film was considered the standard with which to compare the performance of other film sizes, and it first became necessary to designate positive cases by "group opinion" on the 14″ by 17″ films.

Positive cases—that is, cases which should be selected from the group as requiring further study—were defined as those whose films were read as positive by at least three of the five readers. A specific technique was considered to have missed any of these cases if the film for that technique was read as negative by three or more of the readers. In other words, "positive cases" were obtained by "group opinion" on the 14″ by 17″ celluloid films. The performance of the other film sizes in detecting abnormal shadows for these cases was a measure of their relative diagnostic efficiencies. Such results again were obtained by "group opinion." Thus, if a given small film was called positive by only one or even two of the five readers, it was concluded that although the 14″ by 17″ celluloid film revealed the shadow, the shadow on the small film was not sufficiently distinct, since a majority of the readers missed it.

Such a comparison was conducted, and tabulation showed that approximately the same percentage of cases was missed on each of the three film sizes. There were 61 cases which were called positive for tuberculosis by three or more readers on the 14″ by 17″ celluloid films.

The test of the efficiency of the other media was their ability to select these 61 cases. The films for these cases were called negative for tuberculosis by three or more readers in approximately 10 percent of the cases on the 35-mm. films, and a similar percentage was obtained on the 4″ by 10″ and the paper negatives. It was therefore concluded that 35-mm. film, the 4″ by 10″ film, and the 14″ by 17″ paper negatives are *equally efficient* in selecting positive cases.

The study went a step further in that it attempted to determine the relative efficiency of the different media without using the 14″ by 17″ celluloid film as a standard. Instead, it utilized the information yielded by all the media in defining positive cases. This was accomplished as follows: Since there were available four different films for each person, and since each of these films was interpreted independently by five different readers, each person in the study had 20 opportunities to be called positive for tuberculosis (five readings on each of four media). It was therefore argued that for purposes of case finding, "positive cases" may be defined as those having a majority (11 or more of the 20) of positive readings. That is, a person who has at

least 11 positive readings should be selected for further study. By this definition it became possible to line up all four techniques (including the 14″ by 17″ celluloid) and to count the number of positive readings obtained on each technique for all these "positive cases." From this analysis, it was startling to find that the number of positive readings was approximately the same for each of the four techniques. It was therefore concluded that all the film sizes have practically the same efficiency in revealing those cases that require further study.

In evaluating the results of the study, it must be remembered that the purpose was to determine the efficiency of the different film sizes in the selection of positive cases of tuberculosis—that is, to determine the efficiency of these film sizes for case finding. The study was not set up to determine the efficiency of the different film sizes in the more detailed and exacting phases of X-ray work and clinical diagnosis. Doubtless, the texture and morphology of individual tuberculous lesions are less adequately visualized in the miniature films. This may lead to a certain amount of over-reading when miniature films are utilized, and this over-reading may constitute a real problem under some circumstances. It was found, however, that the amount of over-reading is slight in actual practice and that it can be overcome by training.

It was therefore concluded that from the standpoint of their effectiveness in revealing cases of tuberculosis, *no one of the media, not even the 14″ by 17″ celluloid film, is superior to any of the other.*

A number of other conclusions were derived from the study:

1. The problem of inter-individual and intra-individual variation in film interpretation is of such magnitude that it is important to subject this problem to a very extensive and detailed investigation.

2. A revision of the method of classifying X-rays, including that of the NTA classification, is needed. Such revision must be based on extensive study and experimentation.

3. In mass-survey work, it is recommended that all survey films be read independently by at least two interpreters. All persons whose films are selected as positive or suspicious for tuberculosis by either of the interpreters should be recalled for further study.

PHILIPPINES IMMUNIZATION REQUIREMENT

The Republic of the Philippines has modified its requirements concerning smallpox immunization for persons arriving from the United States. According to information received from the Department of State, the present requirement is as follows:

> Officers, crew members, and passengers of all vessels clearing from United States ports for the Philippines are required to present satisfactory certificates of recent smallpox vaccination. Satisfactory certificate of vaccination means evidence that not more than 1 year prior to the actual date of presentation of the certificate the holder has either received a successful smallpox vaccination or had an immune reaction to a smallpox vaccination. Certificates are honored if issued by the United States Public Health Service or by medical officers of United States armed forces or other Government agencies. Certificates issued by private physicians are honored if on professional stationery and duly signed.

It is assumed that "vessels," in the first sentence of the requirement, includes aircraft.

DEATHS DURING WEEK ENDED FEB. 8, 1947

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Feb. 8, 1947	Corresponding week, 1946
Data for 93 large cities of the United States:		
Total deaths	9,663	10,211
Median for 3 prior years	9,953	
Total deaths, first 6 weeks of year	60,030	64,467
Deaths under 1 year of age	783	615
Median for 3 prior years	615	
Deaths under 1 year of age, first 6 weeks of year	4,970	3,629
Data from industrial insurance companies:		
Policies in force	67,295,456	67,160,433
Number of death claims	12,464	14,325
Death claims per 1,000 policies in force, annual rate	9.7	11.1
Death claims per 1,000 policies, first 6 weeks of year, annual rate	9.9	11.7

731140—47-

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED FEBRUARY 15, 1947

Summary

A total of 3,459 cases of influenza was reported, as compared with 3,624 last week and a 5-year (1942–46) median of 5,308. An aggregate of 2,677 cases, or 77 percent of the total, occurred in 3 States—Virginia (490, last week 371), South Carolina (426, last week 409), and Texas (1,761, last week 2,013). The only other States reporting more than 69 cases are Oklahoma 147 (last week 90) and Colorado 140 (last week 144). The total for the year to date is 27,425, as compared with 147,779 for the same period last year and a 5-year median of 33,080.

Of the total of 43 cases of poliomyelitis reported, as compared with 46 last week, no State reported more than 2 cases except California 13 (last week 15), and Michigan 4 (last week 1). For the corresponding week last year 33 cases were reported, and the 5-year median is 26. The total for the year to date is 462, as compared with 313 for the first 7 weeks of 1946 and a 5-year median for the period of 213.

Slight seasonal increases were reported for the week in the incidence of measles and scarlet fever. Both the current and cumulative figures for these diseases, as well as for meningococcus meningitis, smallpox and typhoid and paratyphoid fever, are much below the respective 5-year medians. The current totals for diphtheria and whooping cough are practically the same as the medians. The cumulative figure for diphtheria is slightly below the median, while that for whooping cough is above.

A total of 95 cases of undulant fever was reported (last week 120). The cumulative total is 634, as compared with 451 and 510, respectively, for the corresponding periods of 1946 and 1945. One case of anthrax was reported in Pennsylvania and 1 case of Rocky Mountain spotted fever in Virginia.

Deaths recorded for the week in 93 large cities in the United States totaled 10,007, as compared with 9,663 last week, 10,063 and 9,913, respectively, for the corresponding weeks of 1946 and 1945, and a 3-year (1944–46) median of 9,913. The total for the year to date in these cities is 70,037, as compared with 74,530 for the corresponding period last year.

Telegraphic morbidity reports from State health officers for the week ended Feb. 15, 1947, and comparison with corresponding week of 1946 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria: Week ended— Feb. 15, 1947	Diphtheria: Week ended— Feb. 16, 1946	Diphtheria: Median 1942–46	Influenza: Week ended— Feb. 15, 1947	Influenza: Week ended— Feb. 16, 1946	Influenza: Median 1942–46	Measles: Week ended— Feb. 15, 1947	Measles: Week ended— Feb. 16, 1946	Measles: Median 1942–46	Meningitis, meningococcus: Week ended— Feb. 15, 1947	Meningitis, meningococcus: Week ended— Feb. 16, 1946	Meningitis, meningococcus: Median 1942–46
NEW ENGLAND												
Maine	6	5	1	3	4	2	309	14	14	1	1	1
New Hampshire	0	0	0	2	2	------	11	9	3	0	0	0
Vermont	1	2	0	------	17	------	124	6	6	0	0	0
Massachusetts	12	8	4	------	------	------	634	250	450	3	5	7
Rhode Island	1	0	0	------	------	------	141	4	16	0	0	0
Connecticut	1	1	0	2	14	4	626	84	282	0	2	2
MIDDLE ATLANTIC												
New York	17	17	15	[1] 12	[1] 18	[1] 7	133	1,102	1,102	9	12	32
New Jersey	3	7	6	5	12	13	125	425	425	1	6	6
Pennsylvania	10	19	12	3	4	4	516	1,998	1,174	8	16	21
EAST NORTH CENTRAL												
Ohio	14	39	10	7	26	26	532	104	154	4	4	6
Indiana	17	17	9	8	34	34	35	340	175	2	4	6
Illinois	3	11	11	1	8	8	50	1,035	506	6	9	16
Michigan [2]	8	13	6	1	2	2	260	1,429	249	3	4	5
Wisconsin	5	4	1	54	90	56	154	328	411	0	5	5
WEST NORTH CENTRAL												
Minnesota	5	7	4	------	------	1	63	48	48	1	7	3
Iowa	4	5	4	------	------	2	30	47	133	2	4	4
Missouri	6	12	6	8	5	4	4	415	212	2	7	7
North Dakota	2	4	1	30	9	10	1	3	28	1	0	0
South Dakota	3	1	1	------	------	------	6	110	66	1	0	0
Nebraska	4	3	2	------	26	26	3	146	82	0	2	1
Kansas	5	6	6	3	13	13	3	746	333	0	4	4
SOUTH ATLANTIC												
Delaware	0	1	1	------	------	------	3	8	8	0	2	1
Maryland [2]	4	16	6	4	14	9	37	113	113	1	2	5
District of Columbia	0	0	1	2	5	1	13	48	48	0	3	2
Virginia	10	10	7	490	937	559	245	257	257	3	4	7
West Virginia	6	7	5	41	10	29	95	37	37	0	2	2
North Carolina	14	8	12	------	------	35	478	254	254	2	2	7
South Carolina	1	2	4	426	461	735	43	122	122	0	3	5
Georgia	5	7	5	20	139	145	127	163	163	1	0	1
Florida	7	3	5	10	11	5	4	42	42	1	2	2
EAST SOUTH CENTRAL												
Kentucky	11	8	5	------	93	10	15	371	54	1	3	4
Tennessee	2	11	9	25	213	101	27	253	125	1	6	6
Alabama	1	5	9	43	569	230	25	250	95	2	1	4
Mississippi [2]	7	4	6	------	------	------	------	------	------	0	3	4
WEST SOUTH CENTRAL												
Arkansas	4	2	5	69	318	318	34	60	150	1	2	2
Louisiana	1	13	7	6	541	21	23	195	84	0	5	4
Oklahoma	5	8	8	147	314	248	3	84	84	3	7	4
Texas	25	38	42	1,761	2,885	2,043	100	442	442	3	7	14
MOUNTAIN												
Montana	0	5	5	26	25	22	256	57	168	0	0	0
Idaho	0	4	1	4	39	------	5	73	53	0	0	0
Wyoming	1	3	0	6	2	7	10	19	43	0	1	0
Colorado	10	1	5	140	83	83	45	191	206	2	1	2
New Mexico	5	2	2	1	2	2	38	45	21	1	0	0
Arizona	4	0	3	64	203	166	64	22	22	0	0	0
Utah [2]	0	0	0	13	19	57	8	219	82	0	2	0
Nevada	0	0	0	------	------	------	------	5	5	0	0	0
PACIFIC												
Washington	4	8	4	1	------	3	27	484	215	2	2	4
Oregon	4	7	3	5	28	28	57	144	137	0	2	2
California	30	31	27	16	716	103	238	1,331	683	4	19	19
Total	288	385	287	3,459	8,411	5,308	5,780	13,932	15,869	72	173	281
7 weeks	2,166	2,874	2,366	27,425	147,779	33,080	29,870	53,474	78,682	588	1,468	1,697
Seasonal low week [3]	(27th) July 5–11			(30th) July 26–Aug. 1			(35th) Aug. 30–Sept. 5			(37th) Sept. 13–19		
Total since low	9,732	14,518	11,258	60,400	510,027	68,942	52,757	79,598	116,695	1,560	2,972	3,646

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Dates between which the approximate low week ends. The specific date will vary from year to year.

Telegraphic morbidity reports from State health officers for the week ended Feb. 15, 1947, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever [4]		
	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46
	Feb. 15, 1947	Feb. 16, 1946		Feb. 15, 1947	Feb. 16, 1946		Feb. 15, 1947	Feb. 16, 1946		Feb. 15, 1947	Feb. 16, 1946	
NEW ENGLAND												
Maine	0	0	0	13	52	28	0	0	0	0	1	1
New Hampshire	0	0	0	0	9	8	0	0	0	0	0	0
Vermont	0	0	0	11	11	11	0	0	0	0	0	0
Massachusetts	0	0	0	177	178	373	0	0	0	2	2	2
Rhode Island	0	0	0	18	11	14	0	0	0	0	0	0
Connecticut	0	0	0	36	72	72	0	0	0	0	1	0
MIDDLE ATLANTIC												
New York	2	4	4	338	486	507	0	0	0	2	0	4
New Jersey	1	1	0	109	121	141	0	0	0	0	1	1
Pennsylvania	0	1	0	259	337	337	0	0	0	4	0	5
EAST NORTH CENTRAL												
Ohio	1	0	0	364	327	365	0	0	0	2	2	2
Indiana	2	1	1	124	111	111	1	1	1	2	0	0
Illinois	0	0	0	150	218	272	0	0	0	3	4	1
Michigan [2]	4	0	0	121	134	218	0	0	0	0	0	1
Wisconsin	1	0	0	68	130	219	0	0	0	1	0	0
WEST NORTH CENTRAL												
Minnesota	1	1	0	51	41	82	0	0	0	0	0	0
Iowa	2	1	0	53	60	60	0	1	1	0	0	0
Missouri	0	0	0	38	82	82	0	0	1	1	2	2
North Dakota	0	0	0	15	14	22	0	0	0	0	0	0
South Dakota	0	0	0	17	22	22	0	0	0	0	0	0
Nebraska	0	0	0	52	85	54	1	0	0	0	0	0
Kansas	1	0	0	71	91	91	0	0	0	0	0	0
SOUTH ATLANTIC												
Delaware	0	0	0	12	7	9	0	0	0	0	0	0
Maryland [2]	1	0	0	34	83	83	0	0	0	0	0	0
District of Columbia	1	0	0	13	22	24	0	0	0	0	1	0
Virginia	0	0	0	43	53	53	0	0	0	1	2	2
West Virginia	0	0	0	24	47	47	0	0	0	0	1	1
North Carolina	1	1	1	34	51	51	0	0	0	2	2	1
South Carolina	0	0	0	8	8	8	0	0	0	1	0	0
Georgia	1	1	0	23	16	16	0	0	0	1	1	2
Florida	0	5	0	9	7	7	0	0	0	2	7	3
EAST SOUTH CENTRAL												
Kentucky	0	1	1	38	42	81	0	0	0	0	1	1
Tennessee	2	1	0	48	73	73	0	0	0	1	2	2
Alabama	2	1	1	17	29	22	0	0	0	0	1	1
Mississippi [2]	0	1	1	16	16	12	1	1	1	1	0	1
WEST SOUTH CENTRAL												
Arkansas	0	2	0	1	21	13	0	1	1	0	0	2
Louisiana	1	0	0	5	9	6	0	0	0	1	3	3
Oklahoma	2	0	0	10	17	17	0	4	0	0	1	1
Texas	1	0	2	45	97	83	0	1	4	3	4	4
MOUNTAIN												
Montana	0	1	0	7	7	11	0	0	0	0	0	0
Idaho	0	0	1	14	11	11	0	0	0	2	0	0
Wyoming	0	0	0	10	4	10	0	0	0	0	0	0
Colorado	0	0	1	48	42	58	0	2	0	1	0	0
New Mexico	0	0	0	5	15	15	0	0	0	0	0	0
Arizona	0	0	0	7	17	17	0	0	0	0	0	0
Utah [2]	1	0	0	15	23	71	0	0	0	0	0	0
Nevada	0	0	0	2	0	0	0	0	0	0	0	0
PACIFIC												
Washington	2	1	1	45	45	57	0	0	0	0	0	0
Oregon	0	0	0	45	26	26	0	0	0	3	0	0
California	13	9	8	135	235	235	1	0	0	2	3	3
Total	43	33	26	2,798	3,615	4,069	4	11	14	38	42	67
7 weeks	462	313	213	17,837	21,094	26,048	27	50	88	292	281	419
Seasonal low week [3]	(11th) Mar. 15–21			(32nd) Aug. 9–15			(35th) Aug. 30–Sept. 5			(11th) Mar. 15–21		
Total since low	[5]25,238	13,650	12,284	44,523	59,665	65,022	81	126	205	3,820	4,532	5,547

[2] Period ended earlier than Saturday.
[3] Dates between which the approximate low week ends. The specific date will vary from year to year.
[4] Including paratyphoid fever reported separately, as follows: Massachusetts 2 (salmonella infection); Florida 1; Oregon 1.
[5] Delayed report: Poliomyelitis, Maryland 1 October case and 1 December case, included in total since low.

Telegraphic morbidity reports from State health officers for the week ended Feb. 15, 1947, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Whooping cough: Week ended— Feb. 15, 1947	Whooping cough: Week ended— Feb. 16, 1946	Whooping cough: Median 1942–46	Week ended Feb. 15, 1947: Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis, infectious	Rocky Mt. spotted fever	Tularemia	Typhus fever, endemic	Undulant fever
NEW ENGLAND											
Maine	17	17	36								1
New Hampshire	5	2									
Vermont	7	22	27								3
Massachusetts	179	141	142	1	3						2
Rhode Island	29	34	23								
Connecticut	40	50	45								
MIDDLE ATLANTIC											
New York	135	221	221	5			1				8
New Jersey	87	146	146			2					1
Pennsylvania	178	150	192	3							4
EAST NORTH CENTRAL											
Ohio	134	79	128								3
Indiana	37	14	22								2
Illinois	100	96	96	5			2		4		3
Michigan [2]	226	97	97	2	1						
Wisconsin	148	51	82								3
WEST NORTH CENTRAL											
Minnesota	12	9	32								5
Iowa	17	4	6	1							15
Missouri	15	14	13			1			1		
North Dakota	5	2	2								
South Dakota	1		5								1
Nebraska	9	10	14								
Kansas	13	17	33						6		11
SOUTH ATLANTIC											
Delaware	10	3	3								1
Maryland [2]	60	12	47				1				1
District of Columbia	8	4	10						1		
Virginia	86	38	38	2		14		1	5		
West Virginia	20	13	40								
North Carolina	42	42	126						2		
South Carolina	22	74	51		17				1	3	
Georgia	16	31	18		3				4	7	3
Florida	17	9	19							3	1
EAST SOUTH CENTRAL											
Kentucky	30	8	39						1		
Tennessee	32	41	37	2					2	1	2
Alabama	5	10	9						1	1	3
Mississippi [2]									3	1	4
WEST SOUTH CENTRAL											
Arkansas	15	12	12			1			3		
Louisiana		3	7							3	
Oklahoma	4	1	4						1		1
Texas	332	146	162	36	272	57			1	13	9
MOUNTAIN											
Montana	6	6	15								
Idaho	5	18	5								
Wyoming	1		3								
Colorado	7	28	28								1
New Mexico	31	6	9				1				
Arizona	29	16	16			10					
Utah [2]		37	17								2
Nevada											
PACIFIC											
Washington	25	37	44	8	2	13					1
Oregon	17	21	19			1					
California	96	97	185		1					2	4
Total	2,310	1,889	2,325	65	299	99	5	1	36	34	95
Same week, 1946	1,889			30	220	95	9	2	25	49	59
Median, 1942–46	2,325			17	201	61	9	0	9	37	[6] 68
7 weeks: 1947	17,038			327	2,690	1,479	47	2	334	341	634
1946	12,814			273	2,239	873	54	3	155	386	451
Median, 1942–46	16,017			143	1,538	381	54	3	155	386	[6] 480

[2] Period ended earlier than Saturday.
[6] 2-year median, 1945–46.

Anthrax: Pennsylvania 1 case.
Leprosy: California 2 cases.

NOTIFIABLE DISEASES, FOURTH QUARTER, 1946[1]

The figures in the following table are the totals of the monthly morbidity reports received from the State health authorities for October, November, and December, 1946. These reports are preliminary and the figures are therefore more or less incomplete and subject to correction by final reports. In most instances they include cases reported in both civilian and military populations. The comparisons made are with similar preliminary reports; but, owing to population shifts in many States since the 1940 census, the figures for some States may not be comparable with those for prior years, especially for certain diseases. Each State health officer has been requested to include in the monthly report for his State all diseases that are required by law or regulation to be reported in the State, although some do not do so. The lists of diseases required to be reported are not the same for each State. Only 11 of the common communicable diseases are notifiable in all the States. In some instances cases are reported, in some States, of diseases that are not required by law or regulation to be reported and the figures are included although manifestly incomplete. There are also variations among the States in the degree of, and checks on, the completeness of reporting of cases of the notifiable diseases; therefore, comparisons as between States may not be justified for certain diseases. As compared with the deaths, incomplete case reports are obvious for such diseases as malaria, pellagra, pneumonia, and tuberculosis, while in many States other diseases, such as puerperal septicemia, rheumatic fever, and Vincent's infection, are not reportable.

In spite of these known deficiencies, however, these monthly reports, which are published quarterly and annually in consolidated form, have proved of value in presenting early information regarding the reported incidence of a large group of diseases and in indicating trends by providing a comparison with similar preliminary figures for prior years. The table gives a general picture of the geographic prevalence of certain diseases, as the States are arranged by geographic areas.

Leaders are used in the table to indicate that no case of the disease was reported.

Consolidated monthly State morbidity reports for October, November, and December 1946

Division and State	Anthrax	Chickenpox	Conjunctivitis[2]	Diphtheria*	Dysentery, amebic	Dysentery, bacillary	Dysentery, undefined	Encephalitis, infectious	German measles	Hookworm disease	Influenza	Malaria[3]	Measles*	Meningitis, meningococcus*	Mumps	Ophthalmia neonatorum	Pellagra	Pneumonia, all forms
NEW ENGLAND																		
Maine	------	824	------	46	------	------	------	------	53	------	22	6	1,942	10	345	------	------	167
New Hampshire	------	124	------	1	------	------	------	------	12	------	5	------	431	2	29	------	------	20
Vermont	------	486	------	6	------	------	------	------	38	------	------	------	1,349	2	297	------	------	27
Massachusetts	1	2,230	47	238	1	13	------	2	182	------	------	42	2,041	21	800	35	------	[4] 248
Rhode Island	------	82	------	9	1	4	------	------	5	------	8	[5] 32	153	[5] 8	63	------	------	76
Connecticut	1	1,180	40	9	3	3	------	4	72	------	30	37	494	18	1,028	------	------	567
MIDDLE ATLANTIC																		
New York	5	4,328	------	217	109	190	------	15	[6] 71	[6] 43	[6] 57	182	1,855	73	[6] 501	19	------	2,985
New Jersey	1	4,719	------	77	17	------	2	------	204	------	51	84	606	29	1,197	4	------	985
Pennsylvania	2	6,075	------	197	7	7	------	3	------	1	44	------	3,622	56	2,544	7	------	911
EAST NORTH CENTRAL																		
Ohio	1	3,664	1	232	27	------	3	2	64	------	75	22	1,243	43	1,149	156	------	674
Indiana	------	1,019	4	152	3	------	2	7	15	------	60	37	106	15	94	------	------	88
Illinois	------	4,564	------	84	54	7	------	18	86	------	37	96	161	49	627	88	------	1,006
Michigan	------	4,649	12	78	10	11	------	------	133	2	13	201	484	26	1,052	1	------	475
Wisconsin	------	5,516	------	45	2	------	------	2	70	------	261	7	586	21	1,587	------	------	[4] 79

WEST NORTH CENTRAL																		
Minnesota		649		288	[7] 28		1				9	165	59	19				47
Iowa		841		42	8			4	7		3	14	66	23	178			87
Missouri		363		95			7	1			26	40	23	17	50	1		182
North Dakota		78	2	25				4			51		17	4				165
South Dakota		127		9			4						15		12			10
Nebraska		246		24							70	22	52	10	82			47
Kansas		858	5	85	3			3	19		92	17	70	11	152		1	198
SOUTH ATLANTIC																		
Delaware		50		8			2					2	7	2	10			2
Maryland		483	1	119	1	2	2		24		31	10	170	7	174	10		336
District of Columbia		174		7		2					5	2	91	7	32			220
Virginia		715		206			388				3,713	36	556	26	301		2	772
West Virginia		396		66	1		25				322	2	377	11	199			93
North Carolina				169	1							62	719	12				
South Carolina		358		91	17	57		1	28	161	3,188	674	195	5	108	5	101	942
Georgia		185	10	133	6	23				950	193	71	341	10	42			190
Florida		95	39	211	17	10	20	4	7	1,070	102	245	110	23	111	2	4	324
EAST SOUTH CENTRAL																		
Kentucky		558		295		10			2		6	32	91	20	113			130
Tennessee		310		144	14	2	4	6	14	3	248	55	99	24	52	3	15	523
Alabama		161		138	3			1	5		471	219	114	16	74		11	374
Mississippi		1,456		170	298	996				1,257	10,975	2,626	704	12	732	6	469	3,589
WEST SOUTH CENTRAL																		
Arkansas		279		124	6	7		2	1	1	412	158	146	9	58		2	177
Louisiana		42		98	61	8			5	176	241	81	30	10	19	3	2	599
Oklahoma		193		72	27	2	10	2	12	17	505	131	28	13	69		7	209
Texas		1,764		325	170	3,279	515	2			14,804	1,101	555	52	1,668	37	182	2,112
MOUNTAIN																		
Montana		459	1	14					20		92		441	6	190			57
Idaho		392	27	8			15	1	29		139	5	44	3	84			111
Wyoming		261	1	15	1				32		64	5	25	2	74			42
Colorado		475		80	3	4		2	23		294	2	92	8	129			278
New Mexico		186	2	35	4	35	20	1	7		17	6	248	2	57			197
Arizona		307		37			292	2	30		1,490	21	336	4	121	4	3	383
Utah		1,381		6					30		28	13	87	2	753			52
Nevada		214	8	5		6					10	2	10	1	11			12
PACIFIC																		
Washington		1,448	12	73	2	24	34	3	70		52	6	210	12	597			240
Oregon		449	1	23	1		6	1			71	17	196	7	267			214
California	1	5,897	11	291	39	96		31	423		132	109	1,242	86	1,833			[4] 508
Total	12	61,310	224	4,922	945	4,798	1,352	124	1,793	3,681	38,519	6,697	22,639	849	19,665	381	799	21,730
Fourth quarter 1945	6	42,072	182	7,911	867	5,898	1,897	145	2,598	4,061	401,755	10,192	25,449	1,357	25,042	354	798	28,746
Median 1941–45	16	65,217		6,761	807	5,898	1,897	145	2,965	3,863	40,316	10,881	36,420	1,357	26,082	365	978	28,746
Alaska		126	1	2			3		3		25		5		6			8
Hawaii Territory		191	8	6	8	13			33	3	9	[8] 11	19	4	30			[4] 44
Panama Canal Zone [9]		56		58	7	17						95	196	1	30			[10] 68

Consolidated monthly State morbidity reports for October, November, and December, 1946—Continued

Division and State	Poliomyelitis*	Rabies in man	Rheumatic fever	Rocky Mountain spotted fever	Scarlet fever*	Septic sore throat	Smallpox*	Tetanus	Trachoma	Trichinosis	Tuberculosis, all forms*	Tuberculosis, respiratory	Tularemia	Typhoid fever*	Paratyphoid fever	Typhus fever, endemic	Undulant fever*	Vincent's infection	Whooping cough*
NEW ENGLAND																			
Maine	22				418	6		1		3	152	150		7	1		6	6	154
New Hampshire	58				93	16				6	29			2			15	7	111
Vermont	44				75	1					50						19	24	152
Massachusetts	202				1,155	82		3		11	717	670	2	8	34	1	10		1,883
Rhode Island	35		26		130	3		1		8	148	144		1			[5] 8	3	331
Connecticut	67				247	43		2		4	220	215		1	2		23		445
MIDDLE ATLANTIC																			
New York	498			2	[11] 2,423	([12])		13		28	3,075	2,950		31	8	6	83		2,655
New Jersey	76			1	739	37		1		4	741			9	5	2	15		1,683
Pennsylvania	92	1	217	1	1,340			3		1	889		5	41	[13] 7	1	50		2,014
EAST NORTH CENTRAL																			
Ohio	185		27		2,730	12	5	2		3	1,456		23	27	7	1	40	18	993
Indiana	174			1	761	21	6	1			539	527	55	31			54	6	246
Illinois	735		44	3	1,307	39		11	6	1	2,588	2,394	67	23	5		131	89	1,178
Michigan	388		100		1,694	65	2	14		3	1,535		20	8	[13] 31		32		2,522
Wisconsin	348				726		1				419		1	2	1		96		2,383
WEST NORTH CENTRAL																			
Minnesota	394		21	1	383	104	1	1			[7] 500		1	5	[13] 8		53	19	109
Iowa	226		2		308	8	1				206			9			[5] 356	2	201
Missouri	351		54	1	306	8	5				539		54	26	1	2	14		181
North Dakota	74				49		1				40	40		5			3	9	7
South Dakota	[6] 79				60	2					94			4			11	1	7
Nebraska	233				252						98		2	1			4		65
Kansas	290		2		365		1	3	4		199	191	29	4	1		61	56	147
SOUTH ATLANTIC																			
Delaware	11			1	80	1					55	55		4					59
Maryland	37		33	1	239	40		1		1	639	627	11	8		2	8	1	502
District of Columbia	16				74						756	742	5	5	2				96
Virginia	56			3	546	515		2			974	974	27	25	1	2	21		733
West Virginia	19				596	8					439		8	8	1		1		175
North Carolina	60			5	340	9					829	798	11	9	1	15	1		445
South Carolina	2		82		60	684		3			61		8	6	2	9	9		256
Georgia	36		10	1	164	29		6			614	610	13	6	7	138	34	43	107
Florida	71				92	68	2	18			1,209	1,209	1	23	[13] 93	88	50	40	289

EAST SOUTH CENTRAL																			
Kentucky	21			7	477	26			5		418	414	8	27		2	6		266
Tennessee	45		7	2	360	64	3	7			1,192		43	20	2	23	22	61	218
Alabama	32	1		1	194		1	8			787		2	11		78	25		241
Mississippi	82				140		2		40		795	767	11	18		18	48		1,467
WEST SOUTH CENTRAL																			
Arkansas	94				74	118	1	4	117	1	391	389	30	15		10	10		178
Louisiana	80		24	1	64	85		19			519	494	5	24	1	72	22		40
Oklahoma	98	1			91	28	2	3	92		562		15	6	2		9	6	62
Texas	180	3		1	420	1,164	3		36		1,421		9	82	13	199	148		1,867
MOUNTAIN																			
Montana	20		3	1	70	21			19		88	52		3			6		52
Idaho	21		13		135	37					41		2	8	12		2	22	20
Wyoming	17				49	45	4				7		1					8	55
Colorado	[14] 109		53		296	837					130			4	1		16	8	133
New Mexico	24		1		88			1	10		[7] 391	[7] 369		6		2	1		99
Arizona	20		1		115		1		97		506			11	2		3		218
Utah	35		20		201	4					36	32	9	1	[13] 2		7		52
Nevada	5		1		33	13			4		47						1	18	7
PACIFIC																			
Washington	197		89	1	461	32					496	[15] 279		18	1	1	15	261	187
Oregon	40		5	2	256	27	1		7		157	154		16			9		106
California	506		186		1,586	120		16	6	3	2,182	2,026	5	34	18	21	67		808
Total	6,505	6	1,021	37	22,862	4,422	43	144	443	77	29,976	17,272	483	643	[13] 272	693	1,625	708	26,205
Fourth quarter 1945	4,008	7	1,284	32	32,260	2,441	71	104	234	26	25,514	15,124	246	892	184	1,505	1,262	482	27,460
Median 1941–45	3,222	7		27	32,746	1,843	108	108	499	63	27,058	15,124	246	[16] 1,080	[16] 143	1,494	909	560	31,671
Alaska					3	53					198	189							
Hawaii Territory	12				3	15			2		325	219		1	8	32	3		12
Panama Canal Zone [9]	1										[10] 8			1	1	1			[10] 9

FOOTNOTES FOR TABLE ON PAGES 360 TO 363

*Diseases marked with an asterisk (*) are reportable by law or regulation in all the States, including the District of Columbia. Typhoid fever is reportable in all the States; paratyphoid fever in all except 6 States. Syphilis is reportable in all the States and the District of Columbia but is not included in the table. Some States have increased and some have reduced the list of reportable diseases since the latest published compilation of reportable diseases (Pub. Health Rep., 59: 317-340 (Mar. 10, 1944). Reprint No. 2544).

1 For reports for first, second, and third quarters of 1946, see pp. 836, 1356, and 1822 of the PUBLIC HEALTH REPORTS for June 7, Sept. 13, and Dec. 13, 1946, respectively.

2 Includes cases of kerato- and suppurative conjunctivitis and of pink eye.

3 In a few States practically all contracted outside the continental United States.

4 Lobar pneumonia only.

5 Includes delayed reports.

6 New York City only; figures for some diseases for New York City include supplemental reports not included in first and second quarters of 1946.

7 Includes nonresidents.

8 Off-shipping.

9 Includes the cities of Colon and Panama.

10 In the Canal Zone only.

11 Includes septic sore throat.

12 Included in scarlet fever.

13 Includes cases of salmonella infections.

14 The numbers of cases of poliomyelitis reported in Colorado for the second quarter of 1946 should be 79 and for the third quarter of 1946 should be 717 instead of the figures previously published.

15 For 2 months only.

16 4-year (1942-45) average.

The following list includes certain rare conditions, diseases of restricted geographical distribution, and those reportable in or reported by only a few States; last year's figures in parentheses (where no figures are given, no cases were reported last year):

Actinomycosis: Minnesota 3 (4), South Dakota 2, Tennessee 1.
Botulism: Tennessee 1, New Mexico 7, California 2 (13).
Coccidioidomycosis: Arizona 4, California 12 (13).
Dengue: South Carolina 1 (4), Texas 7, Wyoming 1.
Diarrhea: New York 45, New Jersey 17 (1), Pennsylvania 28, Ohio 120 (170) includes enteritis, Illinois 21 (1), Michigan 4, North Dakota 1, Maryland 31 (41), South Carolina 1,186 (1,828), Florida 12 (11), Colorado 14 (4) includes enteritis, New Mexico 79 (65), Oregon 27 (2) includes enteritis, California 129 (19).
Dog bite: Illinois 2,343 (1,991) (all animal bites), Michigan 1,091 (1,303) Arkansas[8] 128 (63).
Filariasis: Minnesota 1 (1).
Food poisoning: New Jersey 2, Ohio 3, Indiana 5 (5), Illinois 23 (2), Louisiana 2 (7) Idaho 7, Nevada 2, Washington 19, California 133 (141).
Framboesia: South Carolina 1.
Granuloma (unspecified): Ohio 13 (28).
Granuloma inguinale: Missouri 6 (2), Florida 95 (63), Tennessee 20 (20), Mississippi 163 (156), Louisiana 59 (67), Arizona 2 (1).
Impetigo contagiosa: New York 64, Ohio 6 (3), Indiana 43 (26), Illinois 10 (22), Michigan 697 (574), Missouri 2 (4), North Dakota 8, Kansas 7 (13), Maryland 2 (7), Kentucky 13, Montana 19 (7), Idaho 22 (18), Wyoming 14, Colorado 2 (10), Nevada 57 (52), Washington 355 (362).
Jaundice (including hepatitis and Weil's disease): Maine 15 (5), New York 153, Pennsylvania 19, Indiana 4 (43), Illinois 15 (63), Michigan 2 (32), Minnesota 6 (5), Kansas 2 (6), Maryland 3 (10), South Carolina 3 (13), Florida 8 (2), Tennessee 3, Louisiana 3 (4), Montana 1 (6), Idaho 18 (6), Utah 1 (22), Washington 8, Oregon 31 (10), California 37 (108), Hawaii Territory 1 (16).
Leprosy: Michigan 2, Florida 1, Louisiana 1 (3), Colorado 1, California 1 (1).
Lymphocytic choriomeningitis: Massachusetts 2 (2), Tennessee 6 (7).
Lymphogranuloma venereum: Missouri 7 (7), Florida 45 (30), Tennessee 37 (20), Louisiana 15 (45).
Psittacosis: Massachusetts 1, Michigan 4, California 3.
Puerperal septicemia: Florida 2, Mississippi 71 (44), Louisiana 12 (20), New Mexico 1, Nevada 1.
Rabies in animals: Maine 1, New York 318 (137), Ohio 161 (146), Illinois 88 (72), Michigan 5 (3), Missouri 2, Kansas 8 (4), Maryland 2 (11), South Carolina 33 (28), Florida 36, Alabama 115 (123), Arkansas 37 (49), Louisiana 2 (13), Texas 214 (235), Colorado 3, Utah 5 (2), California 76 (90).
Rat bite fever: Louisiana 1.
Relapsing fever: Texas 14 (3), Idaho 1, Arizona 1, California 9 (2).
Ringworm disease: Pennsylvania 1,166 (279), Ohio 130, Illinois 672 (1,159), Michigan 738 (835), Minnesota 4 (170), Missouri 3 (4), Kansas 3 (22), Maryland 2, Idaho 29 (8), Nevada 1 (4), Washington 267 (192).
Scabies: Rhode Island 2, Pennsylvania 317 (47), Ohio 13 (1), Michigan 499 (401), Missouri 23 (4), North Dakota 6, Kansas 67 (33), Maryland 3, Kentucky 17, Montana 33 (26), Idaho 103 (36), Wyoming 5, Nevada 5 (33).
Silicosis: Maine 1, New Hampshire 1, Idaho 1 (1), New Mexico 1 (3).

WEEKLY REPORTS FROM CITIES [1]

City reports for week ended Feb. 8, 1947

This table lists the reports from 89 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0	------	0	34	0	2	0	1	0	0	3
New Hampshire:												
Concord	0	0	------	0	------	0	0	0	2	0	0	------
Vermont:												
Barre	0	0	------	0	20	0	0	0	0	0	0	2
Massachusetts:												
Boston	8	0	------	0	19	1	16	0	36	0	0	39
Fall River	0	0	------	0	11	0	1	0	1	0	0	6
Springfield	0	0	------	0	7	0	0	0	5	0	0	4
Worcester	0	0	------	0	------	0	9	0	11	0	0	20
Rhode Island:												
Providence	0	0	1	0	60	0	2	0	8	0	0	15
Connecticut:												
Bridgeport	0	0	------	0	5	0	1	0	1	0	0	------
Hartford	0	0	------	0	1	0	0	0	2	0	0	------
New Haven	0	0	------	0	33	0	0	0	7	0	0	3
MIDDLE ATLANTIC												
New York:												
Buffalo	1	0	------	0	2	1	4	0	11	0	0	1
New York	16	0	4	1	62	8	61	0	139	0	2	69
Rochester	0	0	------	0	1	0	3	0	14	0	0	4
Syracuse	0	0	------	0	------	0	3	0	18	0	0	9
New Jersey:												
Camden	0	0	------	0	------	1	1	0	5	0	0	4
Newark	0	0	1	0	4	0	5	0	11	0	0	15
Trenton	0	0	------	0	11	0	3	0	7	0	0	1
Pennsylvania:												
Philadelphia	11	0	6	0	11	1	21	0	39	0	2	87
Pittsburgh	0	0	2	0	130	1	10	0	15	0	0	3
Reading	0	0	------	0	2	0	1	0	5	0	0	1
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	1	0	1	0	3	3	6	0	10	0	0	4
Cleveland	0	0	6	1	281	2	8	0	31	0	0	19
Columbus	3	0	1	1	5	0	4	1	9	0	0	3
Indiana:												
Fort Wayne	0	0	------	0	10	0	1	0	1	0	0	------
Indianapolis	3	0	------	0	1	1	0	0	15	0	0	15
South Bend	0	0	------	0	8	0	0	0	7	0	0	1
Terre Haute	0	0	------	0	------	0	1	0	2	0	0	------
Illinois:												
Chicago	8	0	------	0	13	0	22	1	37	0	0	45
Springfield	0	0	------	0	------	0	2	0	3	0	0	------
Michigan:												
Detroit	1	2	------	0	4	0	12	0	41	0	0	98
Flint	0	0	------	0	------	0	2	0	6	0	0	4
Grand Rapids	0	0	------	0	2	0	0	0	5	0	0	4
Wisconsin:												
Kenosha	0	0	------	0	------	0	0	0	5	0	0	2
Milwaukee	0	0	------	0	12	1	2	0	8	0	0	76
Racine	0	0	------	0	2	0	2	0	3	0	0	10
Superior	0	0	------	0	1	0	0	0	0	0	0	------
WEST NORTH CENTRAL												
Minnesota:												
Duluth	1	0	------	0	------	0	0	0	1	0	0	------
Minneapolis	1	0	------	1	4	0	2	0	6	0	0	2
St. Paul	2	0	------	0	3	0	4	0	7	0	0	2
Missouri:												
Kansas City	0	0	------	1	3	0	9	0	15	0	0	7
St. Joseph	0	0	------	0	------	1	0	0	0	0	0	4
St. Louis	1	0	2	0	4	0	9	0	12	0	0	10

[1] In some instances the figures include nonresident cases.

City reports for week ended Feb. 8, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
Nebraska:												
Omaha	0	0	------	0	------	0	5	0	8	0	0	------
Kansas:												
Topeka	0	0	------	0	------	0	0	0	6	0	0	5
Wichita	0	0	------	0	1	0	3	0	1	0	0	4
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0	4	0	2	0	3	0	5	0	0	7
Maryland:												
Baltimore	8	0	1	1	6	4	7	0	10	0	0	70
Cumberland	0	0	------	0	7	0	2	0	0	0	0	------
Frederick	0	0	------	0	------	0	1	0	0	0	0	------
District of Columbia:												
Washington	0	0	2	0	10	0	8	0	14	0	0	1
Virginia:												
Lynchburg	0	0	------	0	------	0	1	0	3	0	0	4
Richmond	0	0	------	0	44	0	3	0	3	0	0	1
Roanoke	0	0	------	0	3	0	0	0	4	0	0	------
West Virginia:												
Wheeling	0	0	------	0	1	0	1	0	1	0	0	------
North Carolina:												
Raleigh	0	0	------	0	3	0	0	0	0	0	0	3
Wilmington	0	0	------	0	4	0	1	0	0	0	0	------
Winston-Salem	0	0	------	0	33	0	0	0	5	0	0	------
South Carolina:												
Charleston	0	0	14	0	5	0	0	0	0	0	0	------
Georgia:												
Atlanta	0	0	------	0	1	0	5	0	7	0	0	1
Brunswick	0	0	------	0	------	0	0	0	0	0	0	------
Savannah	0	0	------	0	25	0	0	0	0	0	0	------
Florida:												
Tampa	1	0	1	0	2	0	2	0	1	0	1	------
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	0	0	3	1	2	0	13	0	3	0	0	14
Nashville	0	0	------	1	------	0	1	0	2	0	0	------
Alabama:												
Birmingham	1	0	4	0	3	0	0	0	2	0	0	------
Mobile	0	0	6	0	1	0	1	3	0	0	0	------
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	------	0	2	0	0	0	1	0	0	2
Louisiana:												
New Orleans	0	0	10	1	3	1	5	0	1	0	0	------
Shreveport	0	0	------	0	------	0	9	0	0	0	0	------
Oklahoma:												
Oklahoma City	0	0	1	0	------	0	1	0	0			------
Texas:												
Dallas	1	0	1	1	4	0	2	0	0	0	0	11
Galveston	0	0	------	0	------	0	1	0	0	0	0	------
Houston	1	0	------	0	------	0	1	0	1	0	0	------
San Antonio	3	0	------	0	1	0	3	1	4	0	0	------
MOUNTAIN												
Montana:												
Billings	0	0	------	0	------	0	0	0	0	0	0	------
Great Falls	0	0	------	0	------	0	1	0	0	0	0	------
Helena	0	0	------	0	6	0	0	0	0	0	0	------
Missoula	0	0	------	0	------	0	0	0	0	0	0	------
Idaho:												
Boise	0	0	------	0	------	0	1		0			------
Colorado:												
Denver	1	0	16	0	4	1	10	0	21	0	0	1
Pueblo	1	0	------	0	1	0	0	0	0	0	0	------
Utah:												
Salt Lake City	0	0	------	0	1	0	0	0	1	0	0	------

City reports for week ended Feb. 8, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle	2	0	------	0	3	0	5	0	2	0	0	5
Spokane	0	0	2	0	5	0	0	0	2	0	0	------
Tacoma	0	0	------	0	3	1	0	0	2	0	0	------
California:												
Los Angeles	22	0	5	6	7	2	5	3	26	0	0	13
Sacramento	0	0	------	0	3	1	0	0	1	0	0	3
San Francisco	0	0	------	0	6	2	6	1	8	0	0	------
Total	93	2	94	16	971	33	336	10	702	0	5	687
Corresponding week, 1946*	114	------	331	56	4,309	------	444	------	945	0	4	590
Average 1942-46*	76	------	286	[2] 58	[3] 3,747	------	[2] 498	------	1,458	1	11	714

[2] 3-year average, 1944-46.
[3] 5-year median, 1942-46.

*Exclusive of Oklahoma City.
Dysentery, amebic.—Cases: New York 3; Rochester 1; Detroit 1; St. Louis 1; Birmingham 1; Los Angeles 2.
Dysentery, bacillary.—Cases: New York 2; Los Angeles 2.
Dysentery, unspecified.—Cases: San Antonio 6.
Tularemia.—Cases: Washington, D. C., 1.
Typhus fever, endemic.—Cases: New York 1; Mobile 3; New Orleans 4.

Rates (annual basis) per 100,000 population, by geographic groups, for the 89 cities in the preceding table (latest available estimated population, 34,526,000)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England	20.9	0.0	2.6	0.0	497	2.6	81.0	0.0	193	0.0	0.0	240
Middle Atlantic	13.0	0.0	6.0	0.5	103	5.6	51.8	0.0	120	0.0	1.9	67
East North Central	6.7	1.2	4.9	1.2	208	4.3	37.7	1.2	111	0.0	0.0	171
West North Central	10.1	0.0	4.0	4.0	30	2.0	64.4	0.0	113	0.0	0.0	68
South Atlantic	15.1	0.0	36.8	1.7	244	6.7	56.9	0.0	89	0.0	1.7	146
East South Central	5.9	0.0	76.7	11.8	35	0.0	88.5	17.7	41	0.0	0.0	83
West South Central	12.7	0.0	30.5	5.1	25	2.5	55.9	2.5	18	0.0	0.0	33
Mountain	15.9	0.0	127.1	0.0	95	7.9	95.3	0.0	175	0.0	0.0	8
Pacific	38.0	0.0	11.1	9.5	43	9.5	25.3	6.3	65	0.0	0.0	33
Total	14.1	0.3	14.2	2.4	147	5.0	50.9	1.5	106	0.0	0.8	104

TERRITORIES AND POSSESSIONS

Hawaii Territory

Plague (rodent).—Plague infection has been proved in a pool of 31 rats trapped on January 9, 1947, in District 1A, Kukuihaele area, Hamakua District, Island of Hawaii, T. H.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended January 25, 1947.—During the week ended January 25, 1947, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		16	2	246	392	22	31	64	113	886
Diphtheria		2	3	43	9	1	2	1		61
Dysentery:										
Amebic					6					6
Bacillary				1					3	4
German measles				16	36		2	13	9	76
Influenza		37			5		1		14	57
Measles		105	2	43	80	202	94	421	489	1,436
Meningitis, meningococcus		1		3	2			1	2	9
Mumps		5		76	433	54	173	39	204	984
Poliomyelitis			1	1						2
Scarlet fever		4	6	53	88	13	4	7	11	186
Tuberculosis (all forms)		1	13	115	34	13	3	51	23	253
Typhoid and paratyphoid fever				6					1	7
Undulant fever					1			1		2
Venereal diseases:										
Gonorrhea		15	12	73	104	43	28	52	76	403
Syphilis		19	2	100	87	8	9	9	45	279
Other forms									3	3
Whooping cough		33	1	76	107	19	6	2	8	252

NOTE.—No report was received from Prince Edward Island for the above period.

JAPAN

Notifiable diseases—4 weeks ended January 25, 1947.—During the 4 weeks ended January 25, 1947, certain notifiable diseases were reported in Japan as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Cerebrospinal meningitis	153	30	Paratyphoid fever	224	11
Diphtheria	2,810	262	Scarlet fever	182	1
Dysentery	232	66	Smallpox	67	5
Encephalitis, Japanese "B"	1	2	Syphilis	6,891	
Gonorrhea	11,756		Typhoid fever	1,100	110
Malaria	635	1	Typhus fever	240	13

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Plague

Madagascar.—Plague has been reported in Madagascar as follows: December 11–20, 1946, 20 cases, 19 deaths; December 21–31, 1946, 43 cases, 42 deaths.

Typhus Fever

Rumania.—For the period January 8–15, 1947, 369 cases of typhus fever were reported in Rumania, including 15 cases reported in Bucharest.

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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HEALTH INSURANCE PROGRAMS AND PLANS OF WESTERN EUROPE

A SUMMARY OF OBSERVATIONS [1]

By JOSEPH W. MOUNTIN, *Medical Director, United States Public Health Service,* and GEORGE ST. J. PERROTT, *Chief, Division of Public Health Methods, United States Public Health Service.*

Among the most conspicuous aspects of postwar reconstruction in Western Europe are the attempts to establish broad social security programs with particular emphasis on health security. Data recently gathered from personal interviews and documents collected in England, France, Belgium, Sweden, Denmark, and the Netherlands reveal the scope and direction of the changes effected or proposed in these countries during or shortly after the war. In all these countries, legislation has been enacted to increase the protection afforded against risks of income loss from sickness, maternity, and permanent disability and to remove or reduce the financial obstacles to preventive, diagnostic, and therapeutic medical care.

All six countries visited—even Sweden which was not an active participant in World War II—have emerged from experiences that severely tested the strength of their social, political, and economic institutions. Yet far from losing faith in their social insurance programs, the people of these countries have united in efforts to expand these programs or other provisions for health security or both.

The two countries (England and Sweden) that escaped invasion and occupation by the German army have formulated comprehensive programs for health and medical care and have discarded all the income and occupational restrictions that formerly limited the coverage of their health insurance programs. The British Government took prompt steps to effect the far-reaching Beveridge proposals—published

[1] From the Divisions of States Relations and Public Health Methods.

The authors gratefully acknowledge the services of E. B. Kovar, Martha D. Ring, and Arthur Weissman in selecting, summarizing, and collating data.

in 1942 while the war outlook was darkest—and, before the close of 1946, Parliament had enacted laws for administering and financing social security programs for the entire population, removing the anomalous restrictions of earlier piecemeal legislation. Within the same period, Sweden took almost parallel steps toward health security and amended its universal old-age and invalidity program to authorize benefit levels that would make supplementary assistance unnecessary for the great majority of pensioners.

The occupied countries (France, Belgium, Denmark, and the Netherlands) face immediate problems of stabilizing currency, restoring productive capacity, and eradicating the effects of low nutritional standards on the health and morale of the population. Their current social security plans appear somewhat less extensive than those of England and Sweden, but they, too, are pursuing the broad objectives of their governments-in-exile or underground resistance forces, which placed social security among the foremost of their postwar aims.

In three countries (England, Sweden, and Denmark), the health security programs will be or already constitute broad, integrated services for public health, hospitalization, and other medical care. In three (France, Belgium, and the Netherlands), the expansion of health insurance coverage and the scope of medical and other social insurance benefits is receiving the greater initial emphasis.

Some of the more significant details of prewar, existing, and proposed social insurance programs for medical care and compensation of income loss during temporary and permanent disability are summarized below for each of the six countries visited.[2] No two countries follow identical paths; no two are wholly alike in social, political, or economic traditions or objectives. From their wartime or postwar health insurance programs, however, emerge general directions or patterns that characterize two or more countries.

1. All six countries initially based their nation-wide health insurance systems on voluntary mutual benefit societies or sickness funds, which, when they met certain requirements for Government approval, were responsible (except in the Netherlands) for administering cash benefits under the insurance system and (except in England) for administering medical benefits. In their new health insurance programs, two countries have abandoned use of these approved societies: In England, their functions in paying cash sickness benefits will be transferred to central, regional, and local government agencies; responsibility for administering medical benefits will be carried by executive councils, regional boards, and hospital management committees. In France, primary and regional funds have been set up with the responsibilities and much of the character of the funds which mutual benefit

[2] No details are included on the workmen's compensation programs of these countries.

societies established for the administration of the earlier system. The four countries (Belgium, Sweden, Denmark, and the Netherlands) that retain sickness funds or mutual benefit societies in their national health insurance systems have developed detailed requirements for their operations.

2. All six countries—whether they discard or retain the approved societies or sickness funds in their national health insurance programs—urge the use of these organizations or similar associations to provide types of protection that will supplement, on a voluntary basis, that afforded by the national system.

3. All six countries seek to avoid "bureaucratic" control of health insurance administration by decentralizing operations, as well as by providing for administrative bodies and advisory groups which, by and large, include representatives of the general public, insured persons, management and labor, and the medical professions.

4. When their proposed programs are in effect, two countries (England and Sweden) will provide medical benefits for the entire population, while three countries (France, Belgium, and the Netherlands) still restrict the coverage of their compulsory health insurance programs to designated occupational or income groups. Denmark will retain income restrictions and the quasi-voluntary aspects of health insurance coverage in its national program. All six countries have developed compulsory invalidity insurance programs of wide coverage.

5. Four of the six countries (all but France and the Netherlands) have removed or propose to remove part of the costs of medical benefits from the health insurance program by substantial subsidies from general tax revenues.

6. All countries permit free choice of practitioners among those who agree to serve in the health insurance system, and all emphasize the "family doctor" principle. Three countries (England, Denmark, and the Netherlands) use a capitation basis for paying general practitioners under the health insurance system, though new provisions in England leave the way open for a supplementary salary, and in Denmark fees for service are a common alternative to capitation payments. Three countries (France, Belgium, and Sweden) use the fee-for-service method of remunerating general practitioners, though Belgium has an additional provision for capitation, and in Sweden some salaried public doctors get fees for serving insured as well as other patients. No specific pattern for paying specialists appears predominant, except that the fee-for-service system is common when specialist care is not included as part of the hospital benefit.

7. The new laws or existing programs of four countries (all but France and the Netherlands) provide that public funds shall meet all or most costs of expensive illness requiring hospitalization and the

services of surgeons and other specialists, removing nearly all financial barriers for these forms of medical benefits. Three of the countries (France, Belgium, and Sweden) require that insured persons bear some part of the costs of general practitioner's services and medicines, by providing reimbursement for only part (two-thirds or three-fourths in Belgium, three-fourths in Sweden's new program, and four-fifths in France) of the fees for service set forth in an approved fee schedule.

8. When an insured person receiving cash sickness benefits has a dependent wife and children, allowances for these dependents are, or will be, payable in three countries (England, France, and Sweden). The benefits payable for illness are, or will be, virtually unlimited in duration in all countries, either by assimilation with disability benefits (England), or by transfer to invalidity pensions (all but England) and subsequent transfer to old-age pensions. Public funds contribute toward cash sickness benefits in all but two countries (France and the Netherlands).

9. In all six countries, medical benefits for insured persons and their dependents, provided or proposed, include most essential services and supplies, though in all countries the existing or recently authorized programs face questions of numbers and distribution of personnel and facilities necessary to meet their health objectives.

10. All six countries are approaching their health insurance programs with due allowance for the need to work out step by step administrative and other details of health security programs in cooperation with the professional and technical personnel concerned and the persons covered by these programs. All recognize that success will depend on that cooperation and on the extent to which national income and productive capacity can be maintained at or raised to adequate levels.

11. In all six countries, medical practitioners and others concerned with health security problems agree, in general, on the value of insurance devices and the use of public revenues to finance medical care programs. The differences of opinion voiced on the need for expanding these programs relate to the details of operation, the income level of the population to be covered, and the rates and methods of remunerating practitioners.

12. Either in conjunction with health insurance or as separate health security programs, all six countries propose to expand tax-supported services for maternity care; child health and welfare; dental care; early case finding and treatment of chronic conditions and tuberculosis, venereal, and other communicable diseases; immunization and vaccination; medical care of assistance recipients and old-age and invalidity pensioners; care of convalescents; and hospitalization. All are working out hospital plans to group small local

units around central well-equipped establishments, so that persons in all parts of the country may have relatively prompt access to the most advanced techniques in the diagnosis and treatment of illness. These programs are cited in the following summaries only insofar as they throw light on the types of medical and maternity services proposed or provided in the health insurance system.

ENGLAND AND WALES

Compulsory health insurance was inaugurated on July 15, 1912, under the provisions of the National Insurance Act of 1911. From 1919 to 1941, amending legislation increased benefits, coverage, and contributions. During 1944, 1945, and 1946, basic recommendations in the PEP (Political and Economic Planning) report of 1937, the Beveridge report of 1942, the reports issued by the Nuffield Provincial Hospitals Trust in 1945 and 1946, and in other studies were enacted into law.

The National Insurance Act of 1944 provides, among other things, for the transfer of all national health insurance functions, except the administration of medical benefits, from the Ministry of Health to the Ministry of National Insurance, a new agency created by the act and established in 1945. The new Ministry will be the central body responsible for cash benefits for wage losses during illness; widows', orphans', and old-age pensions and supplementary pensions; unemployment insurance and assistance; and certain phases of workmen's compensation. In 1945, the Family Allowance Act gave the Minister of National Insurance additional functions, and, in 1946, the National Insurance (Industrial Injuries) Act placed an enlarged workmen's compensation program under the new Ministry. An integrated and extended system of cash benefits is incorporated in the National Insurance Act of 1946, providing substantially increased payments for wage losses during illness and increasing the coverage and benefit levels for these as well as other types of social security.

In 1946 the National Health Service Act was passed, authorizing a comprehensive medical care program under the Ministry of Health. The program, which the Government hopes to place in operation in 1948, is to provide all types of medical services for all persons in the population. On November 6, the day the National Health Service Act for England and Wales received royal assent, a similar bill for Scotland was introduced in the House of Commons.

The broad and integrated social security program adopted for England and Wales embodies all major objectives of the Beveridge plan. It assures some continuing income when family resources are reduced by unemployment, pregnancy, illness, disability, or death of all who work for a living, with supplementary benefits for the dependent members of the family. It provides income for all persons who are permanently disabled and for all aged persons, and distributes over the population as a whole some of the financial burden of rearing children by paying family allowances to all persons who have more than one young child to support. It plans, furthermore, to provide free medical, dental, nursing, and hospital treatment and pharmaceutical supplies for everyone, regardless of income level or insurance status. The effective dates of the National Insurance Act of 1946 and National Health Service Act will be set by the ministries responsible for administration.

Administration

Medical benefits are to be administered nationally by the Ministry of Health assisted by a Central Health Services Council. Regional hospital boards and

local hospital management committees will administer hospital and specialist services; local executive councils will administer the provision of general practitioner, pharmaceutical, dental, and ophthalmic services; local health authorities will be responsible for providing preventive and domiciliary services, and for constructing and maintaining health centers and clinics. Basic regulations governing the National Health Service will be promulgated by the Minister of Health and reviewed by Parliament. Certain regulations governing superannuation, transfer, and compensation of personnel must be approved by Parliament before promulgation.

The administration of cash sickness benefits will be under the jurisdiction of the new Ministry of National Insurance. Approved societies will no longer participate in the compulsory system. Benefit disbursements will be made by the regional and local officers of the Ministry, who pay cash benefits under the other social security programs.

Coverage

Comprehensive medical services will be available to all persons in the population, irrespective of insurance status, age, employment status, or income level. Provision is made for persons, who so desire, to purchase additional services, e. g., special appliances, or private-room care in nursing homes; moreover, all those who wish to receive their medical care and treatment outside the National Health Service may purchase such services through their own arrangements. Under the new National Insurance Act, coverage for cash sickness benefits will include employed (and self-employed) persons over school-leaving age and under pensionable age, without income limit. Persons of working ages who are not in the labor market will be subject to contributions and eligible for other insurance benefits, but will not receive cash sickness benefits.

Until the National Health Service Act becomes effective, coverage for medical benefits remains limited to persons between the ages of 16 and 70 who are employed under a contract of service in manual labor or—if engaged in nonmanual employment—who have a yearly income of not more than £420, without provisions for the care of dependents of insured persons. The Annual Report of the Ministry of Health for 1945 indicates that the total number of compulsorily insured persons in England and Wales was 22,006,000 as of December 31, 1943, or about 53 percent of the total population.

Financing

Under the new National Insurance Act, cash sickness benefits will be paid out of the National Insurance Fund from which other social insurance payments are made. The fund will be made up of contributions of insured persons and employers and of supplemental Exchequer contributions and grants. From these contributions, amounts ranging from 6d. (10¢) to 10d. (17¢) per insured person will be allotted to the National Health Service, even though medical services are to be provided irrespective of insured status—on the theory that the medical service will result in savings to the fund in expenditures for cash sickness benefits. The source of all funds for the National Health Service and the annual amounts estimated to be needed during the early years of operation are (*4*, p. iv):

Source	Amount, in pounds sterling	Percent of total
Total	152,000,000	100
National Insurance Fund	32,000,000	21
Local authorities	10,000,000	7
Exchequer (net amount)	110,000,000	72

Annual expenditures for health services during the early years of operation are estimated as (*4*, p. iii):

Type of expenditure	Amount, in pounds sterling	Percent of total
Total	152,000,000	100
Hospital and specialist services	87,000,000	57
General practitioner, pharmaceutical, dental, and other services [1]	53,000,000	35
Local health authorities' services	12,000,000	8

[1] Includes superannuation and special compensation for medical and dental practitioners.

Single weekly contributions, varying with age, sex, source of income—and for employed persons, with rate of remuneration—will be paid for all cash sickness and invalidity, unemployment, maternity, survivors', and old-age benefits. For employees, the initial weekly rates will range from 2s. 2d. for girls under age 18 to 4s. 7d. for men aged 18–70 who earn more than 30s. a week; the weekly contributions of employers for their employees will range from 1s. 9d. to 5s. 9d. The range for self-employed persons will be from 3s. 1d. for girls under age 18 to 6s. 2d. for men aged 18–70, and for persons who are not gainful workers, from 2s. 3d. to 4s. 8d. These weekly contributions will be paid, as at present, by affixing insurance stamps to contribution cards. The Exchequer supplement will range from 4d. per week for girls to 1s. 1d. for adult males.

Until the new laws are in operation, health insurance contributions remain separate from those for the other social insurance programs and for insured persons, with certain exceptions, range from 2d. a week for juveniles to 5½d. for employed men aged 16–65; in general, the employers' contributions equal those of their insured employees, and the Government supplements the health insurance funds by periodic grants. In 1944, approximate receipts for national health insurance totaled £51,093,000. Of this amount, £34,821,000 represented contributions by employers and employees; £9,867,000 consisted of Parliamentary grants; and interest and miscellaneous receipts accounted for £6,405,000.

Regulations on remuneration of practitioners under the National Health Service Act of 1946 have not yet been promulgated, and agreements have not as yet been made between practitioners and the committees provided for in the act. It is believed, however, that capitation will be the basic method of payment. As under the existing program, patients will have the right to choose their doctor, and doctors will be free to accept or reject any persons who ask to be placed on their panels. Regulations may limit the number of patients on a doctor's list, and provision is made for limiting the number of practitioners in an area. Any physician whose name is entered on any list for the provision of medical care on the day the act becomes effective will be entitled to compensation (payable at retirement, death, or other specified time) for any loss suffered through inability to sell his practice, since the act prohibits such sale.

Until the new system is in operation, insurance practitioners are paid quarterly on a capitation basis, at an annual rate of 15s. 6d. per patient. Under certain conditions, mileage rates are paid for travel. Insured persons choose their own doctors from lists of insurance doctors, and the number of patients on a doctor's list is limited by regulation.

Cash Benefits

Sickness.—Under the new National Insurance Act, the cash benefit for sickness will be the same as for unemployment and will be payable, after a 3-day waiting

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period, to insured persons above school-leaving age and below pensionable age who meet contribution requirements. The weekly rates will be (*2*, p. 80):

Sickness benefit	*Weekly rate*
Married man with wife not gainfully employed	42s.
Single man or woman	26s.
Married man with wife gainfully employed	16s.
Married woman gainfully employed	16s.
Allowance for adult dependent, where payable	16s.
Allowance for first child	[1] 7s. 6d.

[1] This benefit is provided for the child ineligible for children's allowances under the Family Allowance Act of 1945.

The duration of the sickness benefit will be 52 weeks for persons with less than 156 contributions to their credit. For other insured persons, the duration can be unlimited, since no distinction is to be made between short-term and permanent incapacity for work.

Until the new provisions are effective, the rates of benefits are substantially lower (*12*, par. 33):

Insured person	*Weekly benefit rate*	
	Sickness	*Disablement*
Man	18s.	10s. 6d.
Unmarried woman	15s.	9s.
Married woman	13s.	8s.

Reduced rates are paid if 26 but less than 104 weekly contributions have been made, and the duration of cash sickness benefits is limited to 26 weeks. Disablement benefits, at a lower rate, are continued as long as the insured worker remains incapable of working and until he or she reaches pensionable age.

Maternity.—The new law in England and Wales will provide a maternity grant of £4 and either a maternity or a housekeeping attendant's allowance to any woman, if a general practitioner certifies that she has been confined and if she or her husband meets the contribution requirements. The allowance for a housekeeping attendant is to be 20s. a week, payable for a maximum of 4 weeks beginning with the date of confinement. The maternity allowance will be 36s. a week for 13 weeks beginning with the sixth week before the expected week of confinement. Regulations may disqualify a woman from receiving the maternity allowance for periods in which she engages in gainful work or if she fails without good cause to submit to medical examination. Until the new law is in operation, the maternity benefit is a lump sum of 80s. payable to an employed woman insured in her own right, or 40s. if only the husband is insured.

Medical Benefits

The new law authorizes free provision of all types of medical services for all persons: services of general practitioners and specialists; hospitalization (including in-patient and out-patient services, care in mental hospitals, and sanitariums); home nursing; maternal and child health; pharmaceutical, dental, and ophthalmic care; convalescent treatment; medical rehabilitation; vaccination and immunization; and spectacles, dentures, and appliances. Medical and preventive services are to be expanded by the establishment of adequately equipped health centers for use by general practitioners and local health authorities. Free hospitalization will be provided in all institutions except private nursing homes. Under the new act, the Minister of Health will take over all public and all voluntary (private, nonprofit) hospitals; all services of hospital personnel, including surgeons and other specialists, will be provided free of charge. Patients who so desire may make their own financial arrangements for private

rooms in these hospitals, if facilities are available, and for services in private nursing homes.

In scope, the medical benefits authorized under the new law are in sharp contrast with the limited benefits (general practitioner services and routine medicines) under the national health insurance system. Under that system, additional benefits (including dental, opthalmic, convalescent home care, surgical appliances, etc.) have been permitted, however, for approved societies with appreciable surpluses at quinquennial valuations of their funds. Thus, the amount and type of additional benefits have varied according to the financial status of the society in which the insured person was a member. Likewise, no provision has hitherto been made for hospitalization or for specialists' services for insured persons, except as additional benefits from approved societies with adequate financial reserves.

FRANCE

When the war broke out in 1939, France had social security laws providing workmen's compensation; old-age, invalidity, and survivors' pensions; cash and medical benefits for sickness; death benefits; and maternity insurance, including special allowances for nursing mothers and a system of milk vouchers for other mothers. Compulsory cash sickness benefit and medical care insurance was first established, in 1930, under a law enacted in 1928 providing, in addition, for maternity, invalidity, survivors', and death benefits. The law of 1928 was administered largely by approved mutual benefit societies, which established separate local and regional funds for each type of insurance benefit; these funds collected the contributions and distributed the benefits fixed by law.

Although some changes were made in this system of social insurance by the Pétain government during the German occupation, it continued to operate in substantially the same form until the liberation of France in 1944. Soon after liberation, laws were passed setting up a more comprehensive system of social security. The new legislation also provided extended coverage, increased benefits, and a new administrative structure for the social security system. The two major statutes which accomplished these changes were the Ordinance of October 4, 1945, establishing a new system to finance and to administer social insurance benefits, old-age grants, compensation for industrial accidents and occupational diseases, family allowances, and single-wage allowances (special payments to families in which there is only one wage earner), and the Ordinance of October 19, 1945, organizing a new social insurance system for persons employed in nonagricultural occupations covering sickness, maternity, invalidity, old-age, and death benefits. Most of the provisions of both laws went into effect on July 1, 1946.

Further extension of social insurance to cover virtually the entire French population was provided for in a law passed on May 22, 1946; it was stated in the text of the law, however, that most of its provisions were not to come into force until the French industrial production index had reached 125 percent of that of 1938. In September 1946, this index was about 70 percent of 1938.

Administration

Health insurance, including benefits during sickness, maternity, and invalidity, is administered in France through a system of local and regional bodies called social security funds. The insurance system is based wholly on contributions from insured individuals and their employers. Government participation is limited to exercise of technical and financial supervision.

The function of the local bodies, or primary funds, in the administration of health insurance is to award cash and medical benefits for sickness, maternity,

and death benefits. In the local administration of health insurance, the primary funds supersede the formerly approved mutual benefit societies. Primary funds, set up on a provincial (départementale) basis, are governed by administrative councils on which two-thirds of the seats must be held by representatives of insured persons. The remaining third of each primary council's membership must represent employers, family associations,[3] and professional social security experts. Depending on the number of members in a specific fund, its council has either 12, 24, or 36 members. Primary funds must create local sections for each group of at least 2,000 insured persons. In large cities, in addition to ordinary primary funds with 12- or 24-member councils, a central primary fund is established with 36 or 48 members on its administrative council. Two doctors are attached to primary fund councils in an advisory capacity.[4]

Regional funds, replacing the former regional unions of funds, administer health insurance for areas larger than a province. They are responsible for equalizing and reinsuring the risks covered by the primary funds in their area, organizing and directing medical control, and administering invalidity pensions. Regional funds are managed by 26-member councils, composed of representatives of the primary funds in the region.

A national social security fund, replacing the General Guaranty Fund of the prewar system, equalizes and reinsures the risks carried by the regional funds. Its administrative council is made up of representatives of the Council of State, the several ministries concerned with social security, the regional funds, the special funds for administering family allowances, and other national agencies. The representatives from the regional and family allowance funds must be elected.

A General Social Security Directorate in the Ministry of Labor and Social Security supervises the activities of primary, regional, and national funds. It carries out this task through regional social security directorates with supervisory authority over the regional and primary funds. These directorates are also responsible for enforcing the rules of affiliation and for payment of contributions to the funds. A Superior Social Security Council is established to aid the Minister of Labor by advising on all social insurance matters which he may refer to it.

Medical supervision of the work of primary funds is carried out by special medical advisers under a regional medical adviser appointed by each regional fund.

Private mutual benefit societies have lost their compulsory insurance functions under the new postwar legislation. An Ordinance of October 19, 1945, on the status of mutual societies, leaves them free, however, to provide voluntary insurance and benefits supplementing those of the compulsory system.

Coverage

The Ordinance of October 19, 1945, makes compulsory health insurance applicable, with few exceptions, to all persons living in France who are employed in nonagricultural occupations (including self-employed), regardless of income. Formerly, manual workers were covered for compulsory insurance regardless of their yearly income, but other workers were subject to the compulsory system only if their annual income did not exceed Fr. 120,000 (about $1,020). The spouse of an insured person and his nonworking children under age 16, in addition to

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[3] An Ordinance of March 3, 1945, promulgated by the Ministry of Population, gives family associations new legal status; they are defined as groups created for the moral and material protection of the general interests of families.

[4] More recent information indicates some changes in composition and methods of selecting administrative councils of social security funds; higher maximums for cash sickness, maternity, and invalidity benefits; and an increase in the maximum wage on which insurance contributions for nonagricultural workers are based (Secrétariat d'État à la Présidence du Conseil et à l'Information, Direction de la Documentation: La Sécurité Sociale en France, Première Partie: Notes Documentaires et Études, No. 451; October 25, 1946).

certain classes of his dependent relatives, are covered for medical benefits by his contribution. If the insured person's children are invalids, apprentices, or are continuing their education, they are covered for medical benefits by his contribution even if they are older than 16.

Special categories of workers such as miners, railway men, Government employees (national and local), merchant seamen, and those in the gas and electricity industries retain their own occupational insurance schemes and do not come under the general system. Agricultural and forestry workers are insured through a special system of funds under the supervision of the Ministry of Agriculture.

The new law of May 22, 1946, extends benefits of the compulsory social insurance system to virtually the entire population of France. In addition to employed persons, businessmen and owners of industrial and agricultural undertakings are covered, as well as those engaged in occupations from which they receive no income and those with no occupation. The only persons not covered by this act are those covered by separate occupational systems.

Financing

Payments for all social insurance benefits, including health insurance, are made by the funds out of contributions from employers and insured individuals. Under the Ordinance of October 4, 1945, the total contribution for all benefits for those engaged in nonagricultural work, is 12 percent of wages, based on a set maximum annual wage. Half the contribution is paid by the employer, the other half by the employee.[5] The employer pays the total contribution to the primary fund, deducting the employees' share from their wages. The primary fund then transmits to regional and national funds the part of the contributions due them, on an apportionment basis determined annually by the Minister of Labor and Social Security. Employers with less than 10 employees and the self-employed pay contributions on a quarterly basis; all other employers and the voluntarily insured pay on a monthly basis.

Doctors who work under social insurance are paid on a fee-for-service basis. Insurance patients have free choice of physician. Fee schedules, set by agreements between insurance funds and local medical societies, become effective after approval by a special national commission composed of representatives of the funds, medical practitioners, and the ministries concerned. If agreement on fee schedules cannot be reached locally, this commission fixes the rates. Usually, the insurance doctor is paid directly by the patient, and the latter is then reimbursed by the funds in terms of the established fee schedules. The fee for a specific service performed by an insurance doctor is determined by the product of a key-letter (which denotes the type of treatment, e. g., "K," for specialist and surgical care, and the value of which is established for each province) and a coefficient (representing the relative value of the treatment itself) set nationally and published in an official list of professional services performed by all classes

[5] The new law of May 22, 1946, not yet in effect, increases the general contribution rate for groups covered for all social insurance benefits to 16 percent. Nonagricultural employees continue to pay a 6-percent contribution, but their employers must pay 10 percent. Exempt from contributions are dependent children, unemployed persons registered at an employment bureau, and various classes of pensioners; these groups, except the unemployed, receive only medical benefits for maternity and sickness. Only employed persons and those on the same footing and registered unemployed are entitled to daily cash benefits. The contribution basis for nonagricultural employees remains the same (Fr. 120,000 a year); for other gainful workers in the same occupations, it is taxable income from their occupations, with certain minimums; for nonworking spouses of these two groups, it is the maximum old-age pension payable to insured persons at age 65; for other contributors, it is either net taxable income (for those subject to income tax) or half the basic wage of the lowest-paid group of manual workers in the provincial capital. The law also sets contribution bases for gainful workers in agriculture and forestry, but retains their separate funds; and authorizes changes in the administrative councils of social security funds.

of medical practitioners. Special regulations in March and April 1946 increased from 80 percent to 100 percent the reimbursement to insured patients for any treatment, whether by a general practitioner or specialist, on the established list of professional services with a coefficient of 50 or more. Also, since May 1946, doctors are prohibited by law, except in specified circumstances, from charging insured patients more than the scheduled fee for a specific service. All expenses for medical treatment in connection with maternity or long-term illness are reimbursed 100 percent. The value of "K" in Paris and other large cities is now Fr. 75.

Hospital fees for bed, board, and other services for insured persons and their dependents are arranged, in general, by contract between funds and particular hospitals. The patient pays the hospital directly and is reimbursed up to 100 percent under the new regulations. The charges for general practitioner services in a hospital are added to the patient's bill, and he is similarly reimbursed by the funds.

The expenditure in 1945 for cash sickness and medical benefits is shown by the following table (*18*):

Type of expenditure	Amount, in francs	Percent of total	Type of expenditure	Amount, in francs	Percent of total
Total	6,291,000,000	100.0	Drugs	888,000,000	14.1
			Dental care	237,000,000	3.8
General practitioner services	867,000,000	13.8	Hospital and free care	773,000,000	12.3
			Daily cash benefits	3,005,000,000	47.8
Surgical care	348,000,000	5.5	Medical control	173,000,000	2.7

Cash Benefits

Sickness.—The daily cash benefit for short-term illness, under compulsory insurance, is equal to one-half the basic daily earnings of the insured person, up to a maximum of Fr. 150 a day. If he has three or more dependent children, the rate is increased to two-thirds the daily earnings from the thirty-first day after the illness begins. If institutional treatment is required, the daily benefit is reduced by fifths, according to the number of dependents of the insured (by three-fifths if he has no dependents). For long-term illness, a monthly cash allowance 30 times the daily grant for short-term illness is paid by the funds, up to a maximum of Fr. 4,500 a month, or Fr. 6,000 if the insured has three children. If hospital treatment is required, the same reductions are made as in the case of short-term illness. The daily benefit for short-term sickness is limited to 6 months for the same illness; for long-term illness, the duration of the benefit may extend to 3 years. To receive cash benefits for long-term sickness, the insured person must undergo a special examination before the end of the third month of illness. This examination is made by the attending doctor and the medical adviser of the fund. To get cash sickness benefits, the insured person must notify the primary fund of his condition within 3 days after the onset of the illness.

Invalidity.—Any insured individual whose earning capacity has been reduced by two-thirds may receive an invalidity pension, payable quarterly. If he is able to do part-time work, his annual pension amounts to 30 percent of his average annual wage for the preceding 10 years; if he is totally incapacitated for work, he receives 40 percent of the same basic wage; if he requires the constant assistance of an attendant, he gets a special increment of 20 percent of the 40-percent pension for general incapacity. In no case may this increment, however, exceed Fr. 9,000, nor may the total annual pension be less than Fr. 7,200. At the age

of 60, the invalidity pension is superseded by an old-age pension which cannot be less than the invalidity pension it replaces.

Maternity.—The daily cash allowance to insured women for maternity, calculated on the same basis as the cash sickness benefit, is payable for 6 weeks before and 8 weeks after confinement. If confinement results in medical complications, the woman receives sickness benefit instead. The funds fix the monthly allowance to an insured woman for nursing her own child; if the attending physician certifies that she is unable to nurse it, she receives milk vouchers, the value of which cannot exceed 60 percent of the nursing allowance. The amount and duration of the milk-voucher grant is fixed by the attending doctor. Allowances for prenatal and postnatal examinations are also provided in amounts established by each fund. For maternity benefits, the insured person must have been registered as insured for not less than 10 months before the probable confinement date, and provided she ceases all gainful work during the benefit period.

Medical Benefits

Compulsorily insured persons are covered for general and specialist medical care; surgical operations; dental treatment (including necessary dentures); costs of drugs and appliances; laboratory analyses; medical examinations at stated intervals; maintenance and treatment in hospitals, clinics, and dispensaries (and in private nursing homes if medically necessary); and ambulance service. The period for which the funds will pay in full for medical care in connection with tuberculosis treatment has been extended to 10 years (it was 3 years until 1945). Dependents of invalidity pensioners receive medical benefits for sickness and maternity.

Medical benefits for maternity include all expenses for treatment during pregnancy and confinement, provided the woman notifies the primary fund that she is pregnant 4 months before the probable date of confinement; if not, the fund will bear only 80 percent of the costs.

The funds reimburse insured patients for 80 percent of the cost of ordinary drugs, and some special drugs; for other special drugs, the funds repay only 40 percent.

BELGIUM

Before the outbreak of World War II, Belgium had social security programs covering the risks of old age, invalidity, sickness, maternity, costs of rearing children, occupational accident and disease, costs of medical care, involuntary unemployment, and death, for persons dependent on wages or salary for a livelihood. All but a few of these programs, however, were on a voluntary basis, and functioned in accordance with the relative financial resources of various insurance societies, occupational groups, and geographic areas. Believing that social solidarity required a closer integration of provisions to protect workers against involuntary wage loss and costs of health care, representatives of workers and employers met secretly in Belgium as early as 1941 to plan a comprehensive, compulsory social security program, broad in coverage of persons and risks and liberal in terms of benefits provided, to be financed by employer and employee contributions and general revenues. The new program was enacted into law on December 28, 1944, and its administrative agency, the National Social Security Office, was established on January 1, 1945, less than 4 months after liberation from German occupation. The compulsory health insurance program became effective on April 1, 1945, supplanting the voluntary system which had been in operation since 1894.

Administration

To administer national aspects of the health insurance program, a Government agency, the National Sickness and Invalidity Insurance Fund, has been set up in the Ministry of Labor and Social Welfare. The Fund, headed by an Administrator-General, is administered by a National Administrative Committee consisting of representatives of labor, management, unions of the local mutual benefit societies, and Government Departments (Public Health, Finance, and Labor and Social Welfare). The National Administrative Committee makes no decisions on medical, dental, or pharmaceutical matters without the advice of its appropriate technical advisory councils; its functions are to distribute the Fund's resources, develop and effectuate regulations, and propose amendments to laws and legislative orders.

Provincial advisory commissions (composed of representatives of labor, management, and local mutual benefit societies) supervise the operations of provincial control centers, which, in turn, supervise the local health insurance organizations. These insurance organizations are the approved societies which formerly administered the voluntary system. Persons covered by the system must enroll either in an approved benefit society of their choice or in the regional office of the National Sickness and Invalidity Insurance Fund of the area in which they live. The benefit societies and regional offices determine eligibility, pay cash benefits for sickness, maternity, and invalidity, and reimburse insured persons for medical expenses, including expenses for care of their eligible dependents.

Coverage

Coverage is compulsory for nearly all persons bound by an employment contract. About half the 8,300,000 persons in the Belgian population receive their medical care through the health insurance system. In 1946 the system had about 1,700,000 insured persons—20,000 enrolled as members of regional offices, and 1,650,000 as members of the 2,500 approved benefit societies, which are federated in five groups (Socialist, Catholic, Professional, Neutral, and Liberal). With eligible dependents of insured persons—young children and dependent parents aged 55 or over—the number of persons eligible for medical benefits totalled about 4,000,000. Among the excluded groups are the self-employed; persons engaged in agriculture, domestic service, fishing, services in inland navigation, family employment, public employment; merchant seamen; and employees of the National Belgian Railway Company. All excluded groups may later be included by royal order, and coverage for self-employed persons is planned for 1947.

Financing

For each quarter, employers send to the National Social Security Office the total amount of employer and employee contributions payable for the period toward the whole social security program. That Office then sends to the National Sickness and Invalidity Insurance Fund the amounts allotted to health insurance, and the Fund, in turn, distributes to benefit societies and regional offices the sums which represent contributions by or on behalt of their members. These sums are determined on the basis of contribution certificates which employers give their employees to indicate the amount of wages from which the employees' health insurance contributions have been deducted. The worker must give or send this certificate to the benefit society or regional office in which he is enrolled to show that his contribution record is in order. The certificates are sent each quarter to the National Sickness and Invalidity Insurance Fund.

Some 140,000 employers contribute for the health and invalidity insurance program 2.5 percent of the wages of manual workers and 2.25 percent of the

salaries of office workers. Insured persons contribute 3.5 percent of their wages if they are manual workers and 2.75 percent of their salaries if they are office workers. For both employer and employee contributions, only the first Fr. 4,000 a month of remuneration is taxable.

The National Government adds a sum equal to 16 percent of total health insurance contributions as a subsidy to improve medical care. In 1945, the Government contribution was Fr. 350,000,000, or about Fr. 87.5 ($1.75) per person eligible for medical benefits. The National Sickness and Invalidity Insurance Fund also contributes toward medical care for certain noncontributing persons and their families (old-age, survivor, and invalidity beneficiaries; families of persons called to the armed forces; and persons involuntarily unemployed).

Under the former voluntary system, members' contributions varied among funds; employers sometimes contributed for their employees who were members of mutual benefit societies organized for specific occupational groups; and the National Government paid approved societies a subsidy which approximately equalled the members' contributions.

Under the new program, doctors, dentists, midwives, and pharmacists signify each year, at the invitation of the National Fund, their willingness to participate in providing medical benefits under the fee schedules established by agreement between the professional organizations and the National Fund. Each union of mutual benefit societies and each regional office has medical advisers on its staff determined in proportion to its membership (1 medical adviser per 25,000 persons eligible for medical benefits). These medical advisers give no medical treatment; they are responsible for seeing that the medical treatment is effective and economical and for authorizing hospitalization and other special medical benefits.

Insured persons pay their own bills for general medical care, and the insurance organization reimburses them for three-fourths of their payments for office calls and two-thirds of their payments for home calls. The insured person pays no fees for hospitalization, care of specialists, or other special benefits, but, on recommendation of its medical adviser, the insurance organization may curtail these benefits in some cases. A lump sum is paid to an insured woman to cover medical costs of a normal delivery unless, barring circumstances beyond her control, she has failed to call in a physician or registered midwife. The insured person is reimbursed for all but a flat amount (Fr. 4) for drugs and medicines included in the list of pharmaceutical products approved as medical benefits.

The insured person has free choice of practitioner among all persons legally authorized to practice the art of healing and may change at will. He likewise can choose among all hospitals or other institutions approved by the Minister of Public Health. As an alternative, he may engage a practitioner or group of practitioners, hospital, or clinic, to furnish his entire health care for 6 months or a year. In that event, the practitioner or organization accepting him for such care receives a periodic capitation payment, which may be supplemented by a small fee for service payable by the insured person. The fee, in general, would represent the amount for which the insured person is not reimbursed by the insurance organization (one-fourth the charge for an office visit and one-third that for a home call). The fee schedule adopted in September 1946 permits variations in fees for service with changes in the average hourly earnings of skilled and unskilled workers. A unit number is assigned to each medical service, representing the factor by which the average hourly wage (Fr. 7 at that time) is to be multiplied to derive the actual fee. Thus, a surgical delivery is assigned a factor of 300, which yields a fee of Fr. 2,100.

Cash Benefits

Sickness (primary incapacity).—Insured persons are eligible for cash benefits, payable monthly, amounting to 60 percent of their average remuneration in the 4 weeks preceding the onset of illness. The maximum payable is Fr. 3,500 a month. The waiting period is 3 work days for manual workers and 30 days for office workers (by law, the employer is required to give the latter 30 calendar days of sick leave with pay).

Under the former voluntary system, the cash benefit varied among funds, but was at least Fr. 6 a day for men over age 18, Fr. 4 for women, and Fr. 2 for younger persons.

Maternity.—An insured woman receives the equivalent of cash sickness benefits for 6 weeks before and 6 weeks after confinement, provided she leaves work for those periods. Since the maternity benefit is a form of wage-loss compensation, it is paid only to gainfully employed women. Formerly, the cash maternity benefit was a lump sum of Fr. 125, plus a daily benefit of at least Fr. 3 for 6 weeks.

Invalidity.—If, after exhausting rights to cash sickness benefits, an insured person is found to have lost two-thirds of his earning capacity, he becomes eligible for an invalidity benefit equal to one-half his former average daily wage if he has dependents, and one-third if he has no dependents. Invalidity benefits cease when the insured person reaches the age of 65 and qualifies for an old-age retirement pension.

Medical Benefits

Regulations define the medical benefits as continuing medical surveillance aimed at maintaining and improving health; discovery and accurate diagnosis of all abnormal conditions to permit starting the treatment that will restore health and working capacity most rapidly, completely, and economically; and necessary treatment for all pathological conditions discovered. The participating practitioners, persons eligible for care, and insurance organizations must collaborate toward achieving these goals. No limit is set on duration of care, and no waiting period is required.

General care comprises consultations and visits at the office of a general practitioner or specialist; dental care given by a doctor of medicine or licensed or qualified dentist, excluding prosthesis and orthodontia; and pharmaceutical materials. Special care includes surgical operations, services for difficult confinements; examinations by specialists; radiology, laboratory analyses, physiotherapy; hospitalization; spectacles, hearing aids, bandages, and orthopedic appliances; prosthesis, including dental prosthesis and orthodontia; and vocational rehabilitation. Under the former voluntary system, the scope and duration of medical benefits varied among mutual benefit societies. Most of them provided medical and pharmaceutical benefits for at least 2 years and at least 3 months of free treatment for tuberculosis in a sanitarium.

SWEDEN

Sweden, one of the pioneer countries in Western Europe to establish broad programs of social insurance, public assistance, and provisions for health and general welfare, has recently enacted legislation to provide more comprehensive and liberal protection against threats to economic and social security. Under laws (Nos. 431–433) which received royal assent on June 29, 1946, and which will be effective January 1, 1948, the universal compulsory system of old-age and invalidity pensions will require higher contributions and provide larger basic benefits, with supplements, related to need, to take account of geographic variations in the cost of housing and fuel. Contributions will be collected, as they

now are, with income and property taxes, but pensions will no longer be related to contribution records.

Changes in the existing voluntary health insurance system are even more far reaching. On December 18, 1946, the Riksdag approved a bill to establish a compulsory system, to be effective in 1950, which will insure all persons for certain medical benefits, without age, health, income, or occupational restrictions.[6] Under other proposed legislation, free hospital care will be available to the entire population.

Sweden's first national legislation to control and subsidize the operations of sickness funds was enacted in 1891. Subsequently, a basic Sickness Funds Order of 1931 (effective in part in 1935 and in part in 1938) required that, in addition to paying cash sickness benefits, approved funds should reimburse their members for medical expenses; called for registration of all funds with 50 or more members; and provided larger national subsidies. The voluntary system that has evolved through the years has been relatively limited in coverage and in scope of medical benefits. It should be considered, however, in relation to the extent to which rich and poor alike use tax-supported hospitals and other public health facilities. Through district and municipal physicians, nurses, dentists, and hospitals, medical care of sick persons—at a small charge if they are able to pay—is closely associated with general public health services.

Administration

The new compulsory health insurance program will use the administrative machinery of the existing voluntary system. At present, the Royal Pension Board in the Ministry of Social Affairs carries national responsibility for approval of sickness funds, supervision of their activities, and authorization of national subsidies; it also administers the compulsory old-age and invalidity pension program. The Royal Medical Board in the same Ministry is the central authority responsible for determining national standards and issuing regulations for medical benefits. Local governments, district and municipal, administer public medical services through salaried physicians, dentists, nurses, midwives, and hospital staffs. Many of the salaried doctors receive fees under the health insurance system for serving members of sickness funds.

Nearly all functions of health insurance administration are carried by local sickness funds (1,700 in 1946, 1,645 in 1943). Most of these funds are general or community funds, though some cover employees of individual factories or other occupational groups. As a rule, each rural area or small town has only one local fund, while large communities are divided into several districts, each with its own local fund. All local funds are attached to a central fund (29 in 1946, 28 in 1943), and all members of local funds must thus be indirect members of that central fund. Central funds pay cash sickness benefits to their indirect members after the exhaustion of rights to benefits in the local fund.

Coverage

The new compulsory system will waive all coverage restrictions for medical care, but only gainfully employed persons will be insured for cash sickness benefits. Under the existing voluntary system, persons must be in good health and aged 15–40 (in some funds, aged 15–50) when admitted to membership in a sickness fund, and an income restriction applied to coverage for medical benefits excludes persons whose annual assessment for national income and property tax exceeds 8,000 kronor (about $2,240).

[6] No information is yet available on the date of royal assent or statute number of the new health insurance law; data on the program are taken mainly from the Government's bill, introduced September 27, 1946 (48).

On December 31, 1943, a total of 2,147,381 men and women, or approximately 42 percent of the adult population of Sweden, held membership in approved sickness funds. All women members were covered for maternity benefits, and 2,025,000 members had insuied their children under age 15 for medical benefits. The total adult membership at the end of 1943 was distributed as follows (*53*, p. 8):

Insurance carried	Total	Men	Women
Total	2,147,381	1,046,867	1,100,514
Medical benefits only	65,739	11,951	53,788
Cash sickness benefits only	115,439	83,420	32,019
Both types of benefit	1,966,203	951,496	1,014,707

All adults of working age are insured for old-age and invalidity pensions under the existing compulsory system.

Financing

Under the new compulsory system, insured persons will contribute about Kr. 24 a year toward cash sickness benefits and the medical benefits provided by sickness funds, and the contribution will also insure their dependents for medical benefits. Under the voluntary system, contributions have varied among funds; they have differed also with the amount of cash sickness benefit for which insurance is carried and have been increased slightly if the children of the insured person are to be eligible for medical benefits. In general, a person now pays about Kr. 58 a year if his daily cash benefit is Kr. 4 and if he and his children are covered for medical care.

No employer contributions are required under either the new or existing health insurance programs, though some employers now contribute to occupational funds on behalf of their employees.

Under the new law, the National Government will pay a membership subsidy of Kr. 3–6 a year (now a flat Kr. 3 a year) for each contributor; the medical subsidy will continue to represent about half the sickness fund's expenditures for medical benefits; and the subsidy toward cash sickness benefits will also be one-half the fund's expenditures (now it is Kr. 0.50 for each day of cash sickness benefits or hospitalization). In addition, the National Government will bear the entire costs of supplementary cash allowances for the wife and children of insured persons who are in receipt of cash sickness benefits, allowances which are not payable under the voluntary system. The maternity subsidy is now Kr. 75 per confinement for any member of a sickness fund who is eligible for maternity benefits. Some towns also grant subsidies to local sickness funds under the existing voluntary system, and local revenues meet a large share of the costs of hospitalization for insured as well as other persons. Under new proposals, national revenues will bear a large part of these costs for the entire population.

In 1943, the total income of the voluntary health insurance system was Kr. 95,078,000 from the following sources (*53*, p. 22):

Source	Amount, in kronor	Percent of total
Total	95,078,000	100.0
Contributions	58,684,000	61.7
National subsidy	26,628,000	28.0
Interest	1,822,000	1.9
Other	7,944,000	8.4

Total expenditures in the same year amounted to Kr. 81,038,000 (*53*, p. 22):

Type of expenditure	Amount, in kronor	Percent of total
Total	81,038,000	100.0
Cash sickness benefits	40,044,000	49.4
Reimbursement for medical care	19,814,000	24.5
Maternity benefits	8,037,000	9.9
Administration	9,980,000	12.3
Other	3,163,000	3.9

The newly enacted provisions for invalidity pensions will require a maximum contribution of Kr. 100 a year (now Kr. 20) from all persons aged 18–65. This contribution, which varies with income, goes toward old-age as well as invalidity pensions, which are, and will continue to be, largely financed from national and local tax revenues.

The new health insurance law will continue the practice of providing reimbursement for a part of insured persons' expenditures for the services of general practitioners, and, as now, patients will have free choice of the practitioners who are willing to accept them. Insured patients will pay their own fees and will be reimbursed by the sickness fund for three-fourths (now two-thirds) of the amount set for the service in a fee schedule. These fees are now increased for a home call, night call, and the physician's mileage, and higher rates are set for home and office calls in Stockholm than in other parts of the country.

Cash Benefits

Sickness.—Under the new law, nearly all gainful workers will be insured for a uniform amount of Kr. 3.50 a day, with supplements for the wives and children of insured men.[7] The waiting period will be 3 days and the benefit will be payable for as much as 730 days. At present, persons who insure for cash benefits receive, after a 3-day waiting period (which is sometimes increased to 7 days), a daily amount ranging from Kr. 1 to Kr. 6. The benefit is now payable for 18 days by some local funds and for 90 days by those whose reserves are adequate; thereafter, the central fund with which the local fund is affiliated pays the benefit up to a combined total of 2 or 3 years for any one illness. To be eligible, a member must show that a physician has ordered him to abstain from work, or that illness has reduced his working capacity by at least one-fourth.

Maternity.—No information is yet available on the legislative status of proposals to increase the cash maternity benefit and provide it, on a noncontributory basis, for all confinements. The lump sum proposed would be Kr. 200 (now Kr. 110); in addition, employed women would have a daily benefit of Kr. 2–7, depending on their income, payable for 180 days; other women would receive Kr. 1.50 a day for 90 days. Under existing provisions, sickness funds pay the lump-sum maternity benefit only to an employed woman who has been a member for at least 270 days before confinement.

Invalidity.—Under the new law for old-age and invalidity pensions, the basic invalidity pension will be Kr. 1,000 a year for a single person, with supplemental amounts based on need. At present the basic amount is Kr. 70, increased in proportion to contributions paid and the pensioner's need. It is payable to any person aged 16–66 whose working capacity is reduced by two-thirds or more.

[7] Amounts will be lower for adolescents and aged persons. All amounts may be increased through voluntary insurance.

Medical Benefits

The proposed health security system includes hospital services for the entire population without charge, free drugs and medicines obtained on prescriptions, and other medicines at half cost. Medical benefits under the compulsory health insurance program will include reimbursement for three-fourths of amounts set in fee schedules for general practitioners' services and X-ray examinations and treatment by specialists. With other provisions for a comprehensive program of dental care, authorized in 1939, and recently expanded provisions for maternal and child health, both outside the health insurance system, the proposed health services financed from public funds will encompass broad fields of health security for the entire population.

Medical benefits under the present system now vary among funds. They are available without duration limit (except for hospitalization) to insured persons who meet the eligibility requirements and to the young children of members who have contributed on their behalf. General practitioner services comprise consultations and visits at the physician's office or in the patient's home. Specialist care is provided as part of the hospital benefit, which includes ward care for as long as 2 years (3 years in some funds) for any one illness. A few funds include X-ray and physiotherapy services, and a few pay part of the costs of drugs and medicines.

DENMARK

The war and the nearly world-wide concern with measures to extend the scope of social insurance and health services have not greatly affected existing social security programs in Denmark or plans for the future. The reason lies, perhaps, in the breadth and integration of the programs established under the Social Reform Acts of 1933, as well as in the extent to which hospital and other medical services are available at minimal or no charge to nearly all the Danish population. Through liberal grants from national and local tax revenues and the mechanisms of social insurance and public assistance, virtually the entire population has long been protected against the fear of want in old age, invalidity, unemployment, and illness.

In its Sickness Fund Act of 1892, Denmark closely paralleled Sweden by establishing national standards and subsidies for voluntary sickness funds. Since 1921 the distinction between voluntary and compulsory membership in these funds has been virtually obliterated in Denmark. Nearly all persons of working age must pay contributions to the invalidity insurance system, and since these contributions are collected by the sickness funds of the health insurance system, membership in these funds is obligatory. Membership, however, may be passive (without rights to medical or cash benefits) or active (with such rights). Fines, larger in amount than the annual dues for passive membership, and loss of rights to a noncontributory old-age pension and contributory invalidity pension, as well as loss of franchise in the event of receipt of public assistance, serve as strong inducements to maintain membership in the voluntary health insurance system.

Administration

The Sickness Fund Directorate, in the Ministry of Social Affairs, approves local sickness funds, supervises their operations, determines their financial adequacy, authorizes their contracts with physicians and other practitioners, and pays them the amounts due as public subsidies. The Directorate also supervises 18 nonsubsidized sickness benefit societies which offer membership to persons whose resources temporarily or permanently exceed the maximum for active membership in local sickness funds. In the administration of the health insurance

program, the Directorate is assisted by a Sickness Fund Council composed of 12 representatives elected by committees of local sickness funds.

The National Invalidity Insurance Fund is also administered by the Sickness Fund Directorate, with the aid of an Invalidity Insurance Court that determines eligibility for invalidity pensions. All physicians must report to the Invalidity Court any condition among their patients under age 30 that might lead to considerable reduction of working capacity. That Court has authority to provide extensive measures for physical and vocational rehabilitation and financial aid to help start people in occupations suitable to their working capacity.

Local sickness funds, usually only one to a designated geographic area, are the local self-governing units for administering health insurance. Some funds are limited to certain occupational groups, but most are open to all residents of the area, and no one may belong to more than one fund. For Government approval, a fund must have at least 200 members; if the membership falls below that minimum, it must combine with another fund. On January 1, 1945, there were 1,591 approved and subsidized sickness funds. Active members of these funds elect their own officers and advisory committees and control the administration of medical and cash benefits, subject to the supervision of the National Directorate. In addition, the 18 nonsubsidized sickness benefit societies offer passive membership to all income groups and permit active membership (insurance for medical and cash benefits) for persons whose annual income bars them from active membership in the subsidized local sickness funds.

Coverage

Active or passive membership in an approved, subsidized local sickness fund or in one of the 18 nonsubsidized benefit societies is compulsory for all adults under age 60 who are potentially able to make some contribution to self support. When admitted to *active* membership in a subsidized fund, a person must be aged 14–40, must be in relatively good health, and must not have an annual income exceeding 5,800 kroner ($1,218) in Copenhagen, Kr. 5,400 in the provincial towns, and Kr. 4,400 in rural districts, with an additional Kr. 475 a year allowed for each dependent. The value of property owned is also taken into account. These restrictions bar only about 8 percent of the gainful workers of the country.

Active membership includes coverage for medical benefits for the members' children under age 15. Persons with active status in subsidized funds must transfer to passive membership when their property and income exceed the specified limits. Within certain age limits, persons with passive status may become active members when their financial resources decline.

On December 31, 1943, the health insurance system covered about 90 percent of the Danish population of 4,000,000. The membership was distributed as follows (*62*, pp. 9, 72; *66*, p. 38):

Type of membership	Total membership	Subsidized local funds	Nonsubsidized benefit societies
Total	3,716,862	3,471,262	245,600
Active members	3,473,801	3,230,630	243,171
Adults	2,565,320	2,380,630	184,690
Children under age 15	908,481	850,000	58,481
Passive members	243,061	240,632	2,429

Financing

Passive members pay Kr. 2.40 a year, plus an annual contribution of Kr. 7.20–9.60 toward invalidity pensions. Contributions of active members vary among

funds. They also differ with the amount of cash sickness and death benefit for which the person is insured. In Aarhus, for example, insurance for medical benefits for the member and his young children costs about Kr. 2.60–2.80 a month without cash sickness benefits, depending on whether the death benefit is the minimum of Kr. 100 or the maximum of Kr. 300. In addition, active members pay the same contributions toward invalidity pensions as do those with passive status.

Sickness funds collect the monthly contributions from their active members and affix stamps in the members' books to indicate that the contributions have been paid; the funds also collect the annual dues for passive membership and the annual premiums for invalidity insurance. The penalty for failure to pay contributions is Kr. 13 a year, and in certain circumstances may deprive persons of rights to regain active membership, or qualify for invalidity or old-age pensions. Employers do not contribute toward their employees' medical and cash sickness benefits but pay Kr. 6 a year toward invalidity pensions for those whom they employ for a full year.

The National Government pays each approved sickness fund a subsidy of Kr. 2 a year for each active member, plus one-fourth of the amount the fund expends for medical and cash benefits. In addition, the Government pays three-eighths of the fund's expenditures for medical and cash benefits to persons who have a chronic disability on admission. No subsidies or Government payments go to the 18 sickness benefit societies which insure persons in higher income groups.

The local government pays membership contributions for persons who are unable to pay their own dues and subsidies for those who are already disabled when they enter a sickness fund. They either defray the entire costs of hospital care or charge the sickness fund only half the rates nonmembers pay for ward care. In addition, national and local governments share in meeting the costs of invalidity pensions in excess of the amounts contributed.

In 1944, the income of subsidized sickness funds amounted to Kr. 127,321,268, derived as follows (*62*, p. 19):

Source	Amount, in kroner	Percent of total	Source	Amount, in kroner	Percent of total
Total	127,321,268	100.0	National subsidies	28,765,655	22.6
Contributions:			Commune subsidies	3,680,128	2.9
			Interest	1,454,395	1.1
Active members	82,824,320	65.1	"Control tickets" [1]	1,382,881	1.1
Passive members	674,677	.5	Other	8,539,212	6.7

[1] Special charges for calls at night or on Sundays or holidays.

Expenditures of subsidized sickness funds amounted to Kr. 123,932,602 in same period, or Kr. 52.11 per active member (*62*, pp. 20–21):

Type of expenditure	Amount, in kroner	Percent of total	Type of expenditure	Amount, in kroner	Percent of total
Total	123,932,602	100.0	Appliances, spectacles, etc.	1,643,710	1.3
			Home nursing	1,737,665	1.4
General practitioner services	28,326,608	22.8	Cash sickness benefits	9,721,570	7.9
Specialist services	5,562,790	4.5	Cash maternity benefits	6,693,245	5.4
Hospitalization	20,308,612	16.4	Funeral benefits	5,496,890	4.4
Dentistry	6,233,301	5.0	Administration	13,280,013	10.7
Medicines	14,316,154	11.6	Other	10,612,044	8.6

During the same period, expenditures of the invalidity insurance system amounted to Kr. 52,148,961.

At the beginning of each fiscal year, active members of the sickness funds indi-

cate the physician of their choice. About one-third of the subsidized funds, which together have about two-thirds of the total membership, use the capitation method of remunerating physicians. The other funds, mainly those in rural areas, use a fee-for-service method. Under both methods, the physician may charge a small added fee for certifying illness and for night, Sunday, and holiday calls. The capitation amounts and fees for service are agreed on by sickness funds and practitioners, but to be valid must be approved by the Minister of Social Affairs. The sickness fund pays the physician quarterly. The capitation fee varies among funds and differs with the scope of services provided. For a general practitioner in Odense, for example, it is Kr. 9 a year for each insured person (with or without children) on his list, but is 50 percent higher for insured persons who have a chronic disease when admitted to membership.

Cash Benefits

Sickness.—After a qualifying period of 6 weeks, amounts varying from Kr. 0.40 to a maximum of Kr. 6 are payable daily to active fund members whose physicians certify their incapacity for work. Self-employed as well as employed persons may insure for cash benefits, but no one is permitted to insure for more than four-fifths of his customary earnings. Benefits are not payable for sickness of less than 4, or in some cases, 7 days' duration. For protracted illness, the duration of benefits can be as long as 364 days. If the fund member is still incapacitated at the end of a year, he or she may qualify for an invalidity pension.

Maternity.—Employed women who have been active members of a sickness fund for 10 months before confinement receive a cash maternity benefit equal in amount to the sickness benefit for which they are insured. The benefit is usually payable for only 14 days after confinement, but may be extended to as much as 4–6 weeks if the mother is nursing the child or needs longer maternity leave. It is also payable for 8 weeks before confinement, if a physician certifies that continuance at work would be detrimental to the mother's or child's health.

Invalidity.—An insured person who retains less than one-third of his earning capacity is eligible for a monthly pension of Kr. 70.50–175.25, depending on sex, marital status, and the area in which he lives. The basic pension is increased by a supplement for young children dependent on the pensioner, by an additional supplement if the pensioner is helpless or if he is blind or nearly blind, and by a personal supplement related to need. When the invalidity pensioner reaches age 60, his invalidity pension is replaced by an old-age pension of approximately the same amount.

Medical Benefits

For Government approval and subsidy, a sickness fund must guarantee an active member and his or her young children all necessary services of a general practitioner, free hospital treatment, and three-fourths of the member's expenditures for certain prescribed medicines such as insulin and liver preparations. Many funds provide additional benefits, such as services of specialists, dental care, care in convalescent homes, home nursing, and part of the costs of medicines and appliances. For an adult, 6 weeks' active membership is required for eligibility for medical benefits, but there is no qualifying period set for care of his or her young children or for any condition resulting from an accident. If a member receives medical benefits for as many as 420 days in 3 consecutive years, he is transferred to passive membership for at least 12 months. He can be reinstated as an active member thereafter only on medical certification that he is in good health.

As in Sweden, hospitalization includes the free services of surgeons, other specialists, and all other hospital personnel. Central hospitals are already in opera-

tion or planned in all but two of the counties of Denmark proper, providing special equipment and personnel for the care of medical conditions which cannot be effectively or economically diagnosed or treated in the smaller hospitals of the country. Plans for more extensive public health and welfare programs are also under way.

THE NETHERLANDS

When the Netherlands was invaded in 1940, social security programs were in operation for workmen's compensation, old age, invalidity and survivors' pensions, cash benefits for maternity, and funeral benefits. A Children's Allowance Act had been passed in 1939, but not yet put into effect. These programs, varying in comprehensiveness and lacking in coordination, were financed, with few exceptions, by contributions of employers and employees. Mutual benefit societies, approved industrial associations composed of employees' and employers' representatives, and Government-controlled labor boards were authorized to carry out the provisions of the various insurance laws.

Before the war, plans had been made by the Dutch Government to revise the Netherlands' social insurance systems. These plans, directed toward improving administrative coordination, increasing benefits, and extending coverage, were temporarily interrupted by the German invasion. The occupation authorities, however, issued a decree in 1941, establishing a compulsory system of medical care insurance, based on plans that had been worked out by the prewar Dutch Government. Though sponsored by the Germans, this system eventually won favor among the Dutch and was retained after their liberation; it is still in effect and is being used as a basis for further extension of health insurance.

Since the end of World War II, the Dutch Government has again been considering plans for a more comprehensive and administratively simpler social security system. Prepared in 1943 by the Government-in-Exile, these plans propose greater financial participation by the National Government in the provision of social security benefits.

Administration

Compulsory health insurance in the Netherlands is administered under two statutes: the Sickness Law of 1929, providing cash benefits for wage losses during illness; and the Sickness Funds Decree of 1941, providing medical benefits. The cash-benefit system is administered by the Social Insurance Section of the Ministry of Social Affairs and the medical-benefits system by a director responsible to the Minister.

Locally, the Sickness Law of 1929 is administered largely by 24 regional labor boards and by approved industrial associations. The labor boards, public bodies made up of employer and employee representatives, are charged with administration of many of the social insurance programs, including invalidity and old-age pensions and children's allowances. The activities of the labor boards are supervised by the National Insurance Bank. This bank, governed by an 11-man council appointed by the Minister of Social Affairs, holds the funds contributed toward social insurance programs and is authorized to make regulations concerning them.

Approved industrial associations—nonprofit organizations established jointly by central bodies of employers and workers—also administer cash sickness benefits under the compulsory program. Employers may insure their employees for cash benefits either with the Government-controlled labor boards or with private industrial associations. If an employer does not insure for cash benefits with the associations, his employees are automatically covered in this respect by the labor

boards. A large majority of employers in the Netherlands are insured with the industrial associations. By-laws of the associations must be approved by the Minister of Social Affairs.

The insurance work of the labor boards is coordinated by an Association of Labor Boards, and most of the industrial associations belong to a Federation of Industrial Associations, which is authorized to administer the cash-benefit system for its component associations. The Federation, in turn, is affiliated with a private agency called Centraal Beheer (Central Management); in addition, this agency serves mutual benefit societies and commercial insurance companies offering various kinds of voluntary insurance benefits. Centraal Beheer does not insure any risks itself, but merely administers the insurance systems of many of its member organizations. It collects contributions, pays cash benefits, and organizes medical control for some of the industrial associations belonging to it by virtue of their membership in the Federation.

The Sickness Decree of 1941, establishing compulsory medical care insurance, is administered by special funds, called general sickness funds. At the time the decree was promulgated, there were in the Netherlands more than 650 mutual benefit societies of various types, providing voluntary insurance for medical care. Some of them were approved by the Government, under the decree, as "General Sickness Funds" and authorized to administer the compulsory program for medical benefits; on April 1, 1946, there were 170 such funds. Lump-sum funeral grants, provided for by the 1941 Decree, are also administered by the general sickness funds. These funds must submit their by-laws to the Minister of Social Affairs for approval.

Coverage

In general, all persons subject to the Sickness Law of 1929 are also compulsorily insured for medical care under the Sickness Funds Decree of 1941. Covered by both statutes are employees under age 65 who earn not more than 3,000 gulden (about $1,140) a year.[8] Contributions toward medical benefits cover, in addition to the insured person himself, his dependent spouse, his children under age 16, and, under certain conditions, his dependent parents and his spouse's parents.

Self-employed persons are not required to carry health insurance, but may insure themselves on a voluntary basis for medical care with one of the general sickness funds and for cash benefits with the labor boards, provided their annual income, if they live in cities, does not exceed G. 3,000. The income limit for this type of voluntary insurance varies from G. 2,000 to G. 2,500 for self-employed persons living in rural areas. Compulsory and voluntary insurance accounts maintained by the same sickness fund must be administered separately.

Approximately 3,500,000 persons were included under both types of compulsory health insurance on December 3, 1945, and another 2,550,000 were voluntarily insured. The total number of insured persons represents about two-thirds of the Dutch population.

Among the groups excluded from coverage for both types of compulsory health insurance are casual workers; seamen on vessels which sail outside Dutch coastal waters; members of the armed forces; those suffering from occupational diseases (covered under the Accidents Law for compensation); all permanent Government employees; apprentices who do not receive cash wages; and those who earn less than G. 0.40 a day. Some of these groups, such as seamen and Government employees, are covered by separate programs.

[8] A bill has recently been introduced in Parliament to raise the income limit for the compulsory insurance system for cash sickness benefits to G. 3,750 a year.

Invalidity insurance applies, in general, to employees whose annual income does not exceed G. 3,000. In 1943, approximately 4,000,000 people were insured under the compulsory invalidity insurance program.

Financing

Contributions for medical care and cash benefits under the compulsory system normally amount, together, to 7 percent of total wages; 3 percent (2 percent paid by the employer, 1 percent by the employee) goes to finance cash benefits and 4 percent (2 percent each paid by the employer and employee) to finance medical benefits. Both sets of contributions are paid by the employer, who deducts the employee's share from his wages.

The contributions, collected periodically by the labor board sickness funds for cash sickness benefits, are deposited with the National Insurance Bank, and the boards draw on the central fund for payment of benefits. The industrial associations retain contributions collected for cash benefit payments.

A separate reinsurance or equalization fund is set up in the bank to meet the cost of medical benefits. The labor boards and industrial associations collect premiums from the employers every 6 months and deposit the receipts with the equalization fund, which then allots a prorated share of the total contribution to each general sickness fund to cover the cost of medical benefits to its members. A record is kept of the employees' share of the contribution for medical benefits by means of special coupons, purchased by the employers from the Government, and given to insured employees as receipts whenever a contribution is made on their behalf to the general sickness funds.

Premiums paid by voluntarily insured persons for either cash or medical benefits are fixed by the various insurance funds for each individual when he joins the system. Persons who are voluntarily insured for medical care pay their contributions directly to the general sickness fund with which they affiliate. For hazardous industries, such as mining, compulsory contributions for cash benefits are higher than in less dangerous types of work. The increased contribution in such cases must be paid entirely by the employer.

The maximum contribution for invalidity insurance is G. 0.60 per insured person per week, which is paid entirely by the employer. Recently, the National Treasury has also been contributing to the payment of invalidity benefits. Neither the cash sickness nor medical benefit systems, however, receive financial aid from the Government.

Costs of medical care for the 3,317,420 persons compulsorily insured for 1943 (latest available data), based on information received from 157 general sickness funds, have been officially estimated as follows (*71*, p. 9):

Type of expenditure	Amount, in gulden	Percent of total	Cost per insured, in gulden	Type of expenditure	Amount, in gulden	Percent of total	Cost per insured, in gulden
Total	50,100,000	100.0	15.14	Dental care	3,700,000	7.4	1.11
				Obstetrical care	1,100,000	2.2	.33
General medical care	10,500,000	20.9	3.18	Hospital care	11,800,000	23.5	3.56
Medication	9,300,000	18.6	2.82	Administration	5,800,000	11.6	1.74
Specialist care	4,800,000	9.6	1.44	Other benefits	3,100,000	6.2	.96

Total cash benefits for sickness paid in 1942 were G. 43,215,000, at an administrative cost of G. 6,397,000; total contributions for cash benefits for the same period were G. 49,100,000.

Persons insured for medical benefits have free choice of doctor, and may change

every half year; they may also choose their own pharmacist. No more than 3,000 persons, including dependents of insured persons, are permitted on the insurance doctor's panel.

General practitioners are paid by the capitation system, receiving an average remuneration in cities of G. 3.50 per year per individual on their panel from the general sickness funds; a general practitioner with his own dispensary is paid G. 5.20 as a capitation fee. The funds pay specialists, in general, on a fee-for-service basis. These fees vary greatly throughout the country, in accordance with fee schedules which are drawn up by individual funds and doctors, and are comparatively uniform only in large cities.

The funds pay the municipal authorities, in large cities, a certain amount per insured person per year for hospital care; the individual hospitals are then paid by the municipality for care of insured patients. In rural areas, direct payment is usually made to hospitals by the funds.

Many of the general sickness funds operate dental clinics, paying dentists at the rate of G. 5.75 per hour.

Cash Benefits

Sickness.—Cash benefits for illness are payable to an insured person for a maximum of 26 weeks, starting on the third day after the onset of the illness. The allowance, paid for each day during this period except Sunday, usually amounts to 80 percent of the average daily wage earned during the preceding 13 weeks, although, in certain cases, the Government may approve payment of a benefit equal to 90 percent of the average wage. The maximum daily wage on the basis of which the cash benefit may be calculated is G. 8. In certain circumstances, the 3-day waiting period may be reduced and the duration of benefits extended to 12 months. If an insured person receives cash payments for the same illness for a total of 156 days in a 12-month period, he may not receive cash benefits for more than 78 days for that ailment during the following year. Certification of incapacity for cash-benefit purposes is not done by attending doctors, but by special control doctors.

Maternity.—A lump-sum grant of G. 55 is given for maternity whether the woman is insured in her own right or is the dependent of an insured man. This grant is made, however, only if a midwife attends the delivery. The midwife's fee and that of the obstetrical housekeeper-aide are usually met out of this sum. For 6 weeks before and after confinement, an employed woman receives, in addition, cash benefits equal to her full salary, up to a maximum of G. 8 per day. The postnatal payment may be extended to 6 months if childbirth causes incapacity for that length of time.

Invalidity.—When the income of an employed person compulsorily insured for invalidity benefits drops to one-third of normal because of disability, he receives a weekly cash benefit, provided his employer has made 150 weekly contributions on his behalf. The amount of the pension is directly related to the number and amount of contributions made by the employer. Temporary invalidity benefits may be received after 6 months of illness, and permanent benefits whenever the fact of permanent invalidity is established thereafter. Those compulsorily insured for invalidity must register individually with the labor boards. Before the war, the maximum pension was G. 6 a week, but it has now been increased by a grant from the National Treasury to include allowances for dependent children of the insured person.

Medical Benefits

Medical benefits for compulsorily insured individuals and their dependents include general practitioner care; surgical, obstetrical, and other specialist

treatment; hospitalization for 42 days; all necessary medical and surgical appliances; some dental treatment; ambulance service; and part of the cost of care in a tuberculosis sanitarium. Dental work for which the sickness funds pay in full includes extractions, surgery, and cleaning. Dentures are paid for in part by the funds; crowns and bridges must be paid for by the insured person himself.

In maternity cases, an insured woman or the dependent of an insured man is covered for all necessary obstetrical care. Usually, this is accomplished by the G. 55 cash grant provided for payment of the midwife and obstetrical housekeeper-aide. Specialist care during confinement is furnished by some sickness funds, but usually only if the midwife considers it necessary.

Although all drugs are free to those insured for medical benefits, doctors are often limited in the total cost of drugs they may prescribe. Some funds specify that a physician must pay for any drugs he prescribes above a limit set in terms of the average cost of drugs prescribed by the other doctors of the fund.

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DEATHS DURING WEEK ENDED FEB. 15, 1947

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Feb. 15, 1947	Corresponding week, 1946
Data for 93 large cities of the United States:		
Total deaths	10, 007	10, 063
Median for 3 prior years	9, 913	
Total deaths, first 7 weeks of year	70, 037	74, 530
Deaths under 1 year of age	826	631
Median for 3 prior years	642	
Deaths under 1 year of age, first 7 weeks of year	5, 796	4, 260
Data from industrial insurance companies:		
Policies in force	67, 302, 666	67, 161, 803
Number of death claims	10, 354	12, 368
Death claims per 1,000 policies in force, annual rate	8. 0	9. 6
Death claims per 1,000 policies, first 7 weeks of year, annual rate	9. 6	11. 4

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED FEBRUARY 22, 1947

Summary

A total of 5,192 cases of influenza was reported, as compared with 3,459 last week and a 5-year (1942–46) median of 5,984. Increases occurred in the South Central, West North Central, Mountain, and Pacific areas. Of the current total, 4,689 cases, or approximately 90 percent, were reported in 7 States, as follows (last week's figures in parentheses: Texas 2,465 (1,761), Colorado 1,117 (140), Virginia 534 (490), South Carolina 225 (426), Arkansas 126 (69), Arizona 120 (64), Alabama 102 (43). No other State reported more than 74 cases. The total for the year to date is 32,617, as compared with 155,013 for the same period last year, and a 5-year median of 39,064.

Of 37 cases of poliomyelitis reported for the current week (as compared with 43 last week, 40 for the corresponding week last year, and a 5-year median of 26), California reported 9, Virginia 4, and Michigan and North Dakota 3 each. The total to date is 500, as compared with 353 for the corresponding period last year and a 5-year median of 228.

A total of 277 cases of diphtheria was reported, as compared with 288 last week, 337 for the corresponding week last year, and a 5-year median of 261. The cumulative total to date is 2,443, as compared with 3,211 for the corresponding period last year and a 5-year median of 2,627.

The total of 79 cases of meningococcus meningitis reported (last week 72, 5-year median 290) is below the figure for any corresponding week of the past 5 years. To date, 667 cases have been reported, as compared with a 5-year median of 1,987. The corresponding figure for last year is 1,643, the lowest number for the corresponding 8 weeks of any of the past 4 years.

Of the week's total of 114 cases undulant fever (last week 95, total to date 748, same period last year 503), 71 occurred in the North Central area and 20 in Texas.

Deaths recorded for the week in 93 large cities in the United States totaled 9,741, as compared with 10,007 last week, 9,474 and 9,351, respectively, for the corresponding weeks of 1946 and 1945, and a 3-year (1944–46) median of 9,474. The cumulative total is 79,778, as compared with 84,004 for the corresponding period last year.

Telegraphic morbidity reports from State health officers for the week ended Feb. 22, 1947, and comparison with corresponding week of 1946 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46
	Feb. 22, 1947	Feb. 23, 1946		Feb. 22, 1947	Feb. 23, 1946		Feb. 22, 1947	Feb. 23, 1946		Feb. 22, 1947	Feb. 23, 1946	
NEW ENGLAND												
Maine	1	0	0	1	2	2	301	2	15	0	0	1
New Hampshire	0	0	0	1	------	------	7	------	8	0	1	1
Vermont	0	1	0	------	------	------	248	1	14	0	0	0
Massachusetts	13	3	2	------	------	------	461	260	411	3	4	5
Rhode Island	2	0	0	1	1	1	211	4	34	0	1	1
Connecticut	0	0	0	------	9	3	382	68	238	0	2	4
MIDDLE ATLANTIC												
New York	20	19	19	[1] 7	[1] 14	[1] 10	243	1,469	1,469	7	21	27
New Jersey	5	1	2	3	13	13	287	689	689	3	5	6
Pennsylvania	15	13	13	------	6	6	513	1,614	1,614	8	14	25
EAST NORTH CENTRAL												
Ohio	13	22	10	5	21	21	641	239	217	2	4	6
Indiana	10	12	6	8	29	21	41	448	298	0	4	4
Illinois	5	10	13	1	8	12	56	1,483	553	4	15	15
Michigan [2]	5	26	5	2	5	5	72	2,103	285	4	7	12
Wisconsin	0	2	2	20	63	63	196	386	510	1	1	2
WEST NORTH CENTRAL												
Minnesota	8	6	5	------	2	2	114	22	42	4	1	1
Iowa	1	7	4	------	------	2	22	33	276	3	5	3
Missouri	1	6	6	10	6	4	4	360	382	1	7	7
North Dakota	3	0	0	21	6	6	4	------	42	0	2	1
South Dakota	0	0	2	------	------	------	11	133	85	0	1	1
Nebraska	0	1	3	1	4	10	7	70	70	0	0	1
Kansas	7	6	5	61	27	8	9	939	343	2	1	2
SOUTH ATLANTIC												
Delaware	2	0	1	------	------	------	1	6	9	0	0	1
Maryland [2]	8	14	4	6	16	16	38	172	172	2	5	8
District of Columbia	1	1	0	------	------	2	11	41	44	0	0	2
Virginia	4	6	6	534	743	746	267	349	349	2	5	12
West Virginia	1	1	4	52	8	39	89	22	58	1	0	4
North Carolina	8	14	10	------	------	36	209	237	237	2	1	7
South Carolina	0	11	4	225	923	923	33	170	170	1	2	2
Georgia	3	5	5	39	113	113	96	144	144	1	4	3
Florida	6	2	2	18	4	4	11	90	90	0	6	9
EAST SOUTH CENTRAL												
Kentucky	12	9	6	8	10	11	2	426	142	0	3	8
Tennessee	5	4	3	20	91	68	54	186	226	2	7	8
Alabama	11	11	9	102	542	389	40	159	159	2	6	6
Mississippi [2]	4	5	5	------	------	------	------	------	------	0	6	6
WEST SOUTH CENTRAL												
Arkansas	4	11	6	126	259	223	79	66	122	1	3	4
Louisiana	10	7	6	21	594	12	7	97	97	4	1	2
Oklahoma	5	1	6	59	127	129	1	154	105	0	1	1
Texas	29	37	36	2,465	3,030	1,951	152	518	697	8	10	16
MOUNTAIN												
Montana	2	6	2	11	3	11	279	11	125	0	0	1
Idaho	1	0	1	8	44	------	7	45	34	0	0	0
Wyoming	0	0	0	12	1	9	16	35	65	1	0	0
Colorado	3	6	6	1,117	61	61	51	132	228	0	2	3
New Mexico	2	3	2	2	2	2	48	14	28	0	0	1
Arizona	3	12	3	120	154	154	55	39	39	0	0	2
Utah [2]	0	0	0	16	45	45	2	289	111	0	0	0
Nevada	0	0	0	------	------	------	------	------	1	0	0	0
PACIFIC												
Washington	5	5	3	13	------	1	18	469	150	2	1	4
Oregon	10	6	2	2	20	21	23	169	132	0	1	1
California	29	25	25	74	228	126	148	1,362	752	8	15	25
Total	277	337	261	5,192	7,234	5,984	5,567	15,725	16,918	79	175	290
8 weeks	2,443	3,211	2,627	32,617	155,018	39,064	35,437	69,199	96,436	667	1,643	1,987
Seasonal low week [3]	(27th) July 5–11			(30th) July 26–Aug. 1			(35th) Aug. 30–Sept. 5			(37th) Sept. 13–19		
Total since low	10,009	14,855	11,552	65,592	517,261	74,926	58,324	95,323	134,449	1,639	3,147	4,149

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Dates between which the approximate low week ends. The specific date will vary from year to year.

Telegraphic morbidity reports from State health officers for the week ended Feb. 22, 1947, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever [4]		
	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46
	Feb. 22, 1947	Feb. 23, 1946		Feb. 22, 1947	Feb. 23, 1946		Feb. 22, 1947	Feb. 23, 1946		Feb. 22, 1947	Feb. 23, 1946	
NEW ENGLAND												
Maine	0	0	0	20	23	23	0	0	0	0	0	0
New Hampshire	0	0	0	1	2	13	0	0	0	0	0	0
Vermont	0	0	0	10	13	14	0	0	0	0	0	0
Massachusetts	0	1	0	152	153	318	0	0	0	2	3	1
Rhode Island	0	0	0	13	0	17	0	0	0	0	0	0
Connecticut	0	1	0	60	39	79	0	0	0	1	1	1
MIDDLE ATLANTIC												
New York	1	3	1	359	451	486	0	0	0	0	0	4
New Jersey	0	0	1	156	108	134	0	1	0	2	2	1
Pennsylvania	0	1	1	200	319	535	0	0	0	2	1	3
EAST NORTH CENTRAL												
Ohio	0	2	1	406	373	373	0	0	0	0	0	3
Indiana	0	0	0	136	113	164	0	0	1	2	3	3
Illinois	2	0	0	134	210	327	0	0	1	2	0	1
Michigan [2]	3	1	1	197	142	241	0	0	0	1	1	1
Wisconsin	0	1	0	94	141	229	0	0	1	1	0	0
WEST NORTH CENTRAL												
Minnesota	2	0	0	50	60	101	0	0	0	0	0	0
Iowa	0	0	0	39	59	72	0	1	1	0	0	0
Missouri	0	1	0	40	75	133	0	0	0	0	3	1
North Dakota	3	0	0	14	1	30	0	0	0	0	0	0
South Dakota	0	0	0	22	18	18	0	0	0	2	0	0
Nebraska	0	1	0	40	34	82	0	0	0	0	0	0
Kansas	1	0	0	54	99	117	0	1	0	2	0	0
SOUTH ATLANTIC												
Delaware	0	0	0	11	7	7	0	0	0	0	1	0
Maryland [2]	0	1	0	24	81	102	0	0	0	1	0	0
District of Columbia	0	0	0	11	26	35	0	0	0	0	0	0
Virginia	4	0	0	45	61	61	0	0	0	3	2	2
West Virginia	0	0	0	10	37	43	0	0	0	0	0	2
North Carolina	1	1	0	22	46	44	0	0	0	0	0	0
South Carolina	1	0	0	11	11	7	0	0	0	0	0	1
Georgia	0	4	0	23	10	20	0	1	0	2	3	3
Florida	2	5	1	16	8	15	0	0	0	3	0	0
EAST SOUTH CENTRAL												
Kentucky	0	0	0	42	29	73	1	0	0	5	0	0
Tennessee	1	2	0	27	24	85	0	0	0	1	1	3
Alabama	1	1	1	20	9	18	1	0	0	1	2	1
Mississippi [2]	1	4	1	9	10	11	0	0	0	0	0	1
WEST SOUTH CENTRAL												
Arkansas	1	1	0	5	11	9	0	1	1	0	0	0
Louisiana	0	1	1	2	13	12	0	0	0	3	2	2
Oklahoma	2	1	1	10	21	32	0	0	0	0	2	2
Texas	1	1	1	38	78	78	1	2	1	1	6	5
MOUNTAIN												
Montana	0	0	0	6	1	22	0	0	0	1	1	0
Idaho	0	0	0	15	2	3	0	0	0	0	0	0
Wyoming	0	0	0	6	5	11	0	0	0	0	0	0
Colorado	0	1	0	53	34	63	0	0	0	0	2	0
New Mexico	0	0	0	10	24	10	0	0	0	0	0	0
Arizona	0	0	0	7	8	12	0	0	0	0	0	0
Utah [2]	1	0	0	11	41	51	0	0	0	0	0	0
Nevada	0	0	0	2	0	0	0	0	0	0	0	0
PACIFIC												
Washington	0	2	0	42	19	62	0	0	0	0	0	0
Oregon	0	0	0	47	21	21	0	0	0	3	1	1
California	9	3	3	146	218	218	0	1	0	0	2	2
Total	37	40	26	2,868	3,288	4,367	3	3	13	41	39	53
8 weeks	[5] 500	353	228	20,705	24,382	30,415	30	58	113	333	320	478
Seasonal low week [3]	(11th) Mar. 15–21			(32nd) Aug. 9–15			(35th) Aug. 30–Sept. 5			(11th) Mar. 15–21		
Total since low	[5] 25,275	13,690	12,308	47,391	62,953	69,361	84	134	230	3,861	4,571	5,612

[2] Period ended earlier than Saturday.
[3] Dates between which the approximate low week ends. The specific date will vary from year to year.
[4] Including paratyphoid fever reported separately, as follows: Massachusetts 2 (salmonella infection); New Jersey 1; South Dakota 2; Maryland 1; Virginia 1; Georgia 1; Kentucky 1; Oregon 1.
[5] Delayed report: Poliomyelitis, Arkansas, week ended February 8, 1 case, included in cumulative totals.

Telegraphic morbidity reports from State health officers for the week ended Feb. 22, 1947, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Whooping cough: Week ended— Feb. 22, 1947	Whooping cough: Week ended— Feb. 23, 1946	Whooping cough: Median 1942–46	Week ended Feb. 22, 1947: Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis, infectious	Rocky Mt. spotted fever	Tularemia	Typhus fever, endemic	Undulant fever
NEW ENGLAND											
Maine	18	23	32								
New Hampshire		1	1								
Vermont	15	14	23								3
Massachusetts	154	81	125		4		1				
Rhode Island	10	22	22								
Connecticut	40	58	58								3
MIDDLE ATLANTIC											
New York	155	177	177	9	2						3
New Jersey	186	108	115				1				1
Pennsylvania	238	123	171						1		
EAST NORTH CENTRAL											
Ohio	126	84	177								5
Indiana	68	10	26						2		2
Illinois	66	97	97				1		1		6
Michigan [2]	236	132	132		1						12
Wisconsin	180	62	103								14
WEST NORTH CENTRAL											
Minnesota	10	12	34	3							6
Iowa	48	4	12								20
Missouri	31	4	16								
North Dakota			4								
South Dakota	1		2			10					4
Nebraska	22	4	12								
Kansas	15	17	39				1	1	2		2
SOUTH ATLANTIC											
Delaware	5	5	1								
Maryland [2]	92	24	40	1						1	1
District of Columbia	9	5	6								
Virginia	111	43	54			47			1	1	
West Virginia	10	5	39								
North Carolina	32	56	123						2	1	
South Carolina	14	31	47	2	1				2		
Georgia	12	4	11		2				5	12	1
Florida	24	20	20						2	7	1
EAST SOUTH CENTRAL											
Kentucky	20	23	41						3	2	
Tennessee	20	12	40	1					2	1	
Alabama	31	13	25							3	3
Mississippi [2]									2	1	1
WEST SOUTH CENTRAL											
Arkansas	16	9	9	1	1	1			1		
Louisiana		4	2	3	1				2	4	
Oklahoma	24	1	13					1	1		
Texas	410	108	124	7	279	59			1	10	20
MOUNTAIN											
Montana	1	4	12						1		
Idaho	10	7									
Wyoming	12		2						1		
Colorado	44	31	30		1						1
New Mexico	34	6	9	1							
Arizona	14	14	29			25					1
Utah [2]	4	12	19								1
Nevada		3	1								
PACIFIC											
Washington	33	33	24	1		4					2
Oregon	12	15	18	3							
California	118	71	233	1	1		1			1	1
Total	2,731	1,582	2,406	33	293	146	5	2	32	44	114
Same week, 1946	1,582			49	189	82	7	0	20	52	52
Median, 1942–46	2,406			30	195	59	9	1	16	37	[6] 61
8 weeks: 1947	19,769			360	2,983	1,625	52	4	366	385	748
1946	14,396			322	2,428	955	61	3	175	438	503
Median, 1942–46	18,423			182	1,733	488	61	3	175	436	[6] 589

[2] Period ended earlier than Saturday.
[6] 2-year average, 1945–46.

Anthrax: Massachusetts 1 case; New Jersey 1 case; Pennsylvania 1 case.

NOTIFIABLE DISEASES, YEAR 1946

The figures in the following table are the totals of the monthly morbidity reports received from the State health authorities for the year 1946. These reports are preliminary and the figures are therefore more or less incomplete and subject to correction by final reports. In most instances they include cases reported in both civilian and military populations. The comparisons made are with similar preliminary reports; but, owing to population shifts and the presence of large military populations in many States since the 1940 census, the figures for some States may not be comparable with those for prior years, especially for certain diseases. Each State health officer has been requested to include in the monthly report for his State all diseases that are required by law or regulation to be reported in the State, although some do not do so. The lists of diseases required to be reported are not the same for each State. Only 11 of the common communicable diseases are notifiable in all the States. In some instances cases are reported, in some States, of diseases that are not required by law or regulation to be reported and the figures are included although manifestly incomplete. There are also variations among the States in the degree of, and checks on, the completeness of reporting of cases of the notifiable diseases; therefore comparisons as between States may not be justified for certain diseases. As compared with the deaths, incomplete case reports are obvious for such diseases as malaria, pellagra, pneumonia, and tuberculosis, while in many States other diseases, such as puerperal septicemia, rheumatic fever, and Vincent's infection, are not reportable.

In spite of these known deficiences, however, these monthly reports, which are published quarterly and annually in consolidated form, have proved of value in presenting early information regarding the reported incidence of a large group of diseases and in indicating trends by providing a comparison with similar preliminary figures for prior years. The table gives a general picture of the geographic prevalence of certain diseases, as the States are arranged by geographic areas.

Leaders are used in the table to indicate that no case of the disease was reported.

Consolidated monthly State morbidity reports for the year 1946

Division and State	Anthrax	Chickenpox	Conjunctivitis [1]	Diphtheria*	Dysentery, amebic	Dysentery, bacillary	Dysentery, undefined	Encephalitis, infectious	German measles	Hookworm disease	Influenza	Malaria [2]	Measles*	Meningitis, meningococcus*	Mumps	Ophthalmia neonatorum	Pellagra	Pneumonia, all forms
NEW ENGLAND																		
Maine	--------	2,303	--------	144	4	--------	1	--------	916	--------	186	88	4,868	36	3,761	--------	--------	744
New Hampshire	--------	479	--------	5	1	--------	--------	--------	471	--------	70	17	2,484	22	613	--------	--------	94
Vermont	--------	1,990	--------	32	--------	--------	--------	--------	1,640	--------	314	--------	3,070	7	2,191	--------	--------	157
Massachusetts	2	11,561	236	452	4	68	--------	8	4,617	2	--------	497	38,416	121	5,811	122	--------	[3] 1,484
Rhode Island	--------	618	--------	32	2	11	--------	1	37	--------	46	[4] 203	1,318	38	421	--------	--------	313
Connecticut	1	5,269	70	72	29	14	--------	6	2,462	6	825	456	7,918	89	8,928	1	--------	2,727
MIDDLE ATLANTIC																		
New York	11	20,818	--------	830	283	455	--------	52	[5] 3,377	[5] 122	[5] 394	2,061	87,065	546	[5] 5,844	70	--------	15,195
New Jersey	3	16,552	--------	250	38	17	43	8	10,197	--------	412	932	56,508	180	9,192	18	--------	4,186
Pennsylvania	13	18,365	--------	752	12	11	--------	20	--------	1	182	[6] 1	55,927	421	13,230	17	--------	3,522
EAST NORTH CENTRAL																		
Ohio	1	11,543	2	912	98	9	8	9	2,120	--------	515	414	16,121	264	6,716	530	1	2,740
Indiana	--------	3,118	15	485	24	5	6	39	216	6	902	344	11,942	101	1,008	1	--------	318
Illinois	--------	11,728	--------	474	199	38	--------	57	1,364	--------	333	[4] 562	25,995	366	5,286	421	--------	6,149
Michigan	--------	14,137	136	387	43	84	1	4	3,267	2	132	[4] 1,306	42,264	185	9,470	18	--------	2,280
Wisconsin	--------	18,612	--------	158	13	--------	--------	7	6,198	--------	2,616	69	46,465	104	17,071	7	--------	[3] 649

WEST NORTH CENTRAL																		
Minnesota	-------	2,113	1	754	[7] 109	4	8	3	-------	[7] 12	79	999	1,335	118	-------	-------	-------	218
Iowa	-------	1,895	-------	190	31	1	-------	10	120	-------	62	280	4,288	94	1,424	-------	-------	2,291
Missouri	-------	1,007	3	272	-------	-------	25	8	150	-------	221	354	6,547	147	1,051	1	-------	1,087
North Dakota	-------	290	3	87	5	5	7	16	-------	-------	344	5	236	20	-------	-------	-------	681
South Dakota	-------	415	1	70	-------	-------	4	-------	-------	-------	[8] 164	18	1,061	15	276	-------	-------	36
Nebraska	2	1,291	-------	84	6	-------	2	17	-------	-------	1,151	157	5,624	29	498	-------	-------	144
Kansas	-------	2,829	137	366	12	-------	1	19	486	• 2	2,703	61	12,886	51	2,842	-------	1	712
SOUTH ATLANTIC																		
Delaware	-------	255	-------	18	-------	-------	2	-------	-------	-------	-------	12	624	17	62	-------	-------	12
Maryland	-------	3,181	10	546	9	21	8	6	989	-------	210	73	11,503	96	778	27	1	1,721
District of Columbia	-------	639	-------	16	-------	11	-------	-------	-------	-------	41	27	4,516	55	367	-------	2	992
Virginia	-------	2,759	-------	548	7	-------	2,716	-------	-------	-------	24,875	498	13,390	203	1,730	-------	31	3,018
West Virginia	-------	955	-------	212	44	1	26	1	-------	-------	4,679	88	2,673	83	1,048	-------	-------	293
North Carolina	-------	-------	-------	590	19	8	-------	3	-------	-------	-------	369	9,011	120	-------	-------	-------	-------
South Carolina	-------	1,531	-------	249	70	701	-------	1	678	924	22,829	5,933	7,579	24	1,147	23	707	4,226
Georgia	-------	652	32	341	37	119	29	2	-------	4,928	1,930	583	4,142	46	413	-------	25	809
Florida	-------	971	87	450	80	14	29	15	163	3,742	592	500	3,120	94	1,561	18	13	755
EAST SOUTH CENTRAL																		
Kentucky	-------	1,216	-------	566	2	84	-------	12	141	7	3,214	329	7,554	145	747	-------	8	1,021
Tennessee	-------	1,090	5	358	27	29	15	26	370	13	2,931	388	4,877	152	315	6	51	2,362
Alabama	-------	854	-------	370	25	-------	-------	19	1,134	-------	11,260	1,541	3,992	129	888	-------	33	3,582
Mississippi	-------	6,541	-------	441	1,395	7,160	-------	-------	-------	4,951	63,677	17,387	19,322	99	5,384	32	2,065	16,506
WEST SOUTH CENTRAL																		
Arkansas	-------	998	-------	345	101	54	1	10	787	2	6,059	1,340	3,281	96	1,231	2	21	1,149
Louisiana	-------	394	-------	326	194	39	-------	5	213	495	20,108	745	3,423	112	530	14	6	2,689
Oklahoma	-------	629	-------	209	46	14	12	13	14	21	6,578	512	4,556	67	452	1	23	998
Texas	1	11,184	-------	1,544	851	14,742	1,919	33	-------	-------	79,259	6,799	31,465	312	12,684	105	893	9,838
MOUNTAIN																		
Montana	-------	1,485	46	58	3	-------	3	2	541	-------	931	10	2,130	18	1,346	-------	-------	398
Idaho	1	912	66	54	4	-------	34	4	655	-------	1,877	66	2,184	12	490	-------	-------	387
Wyoming	-------	538	22	45	7	-------	-------	2	101	-------	84	49	1,075	8	213	-------	-------	123
Colorado	-------	2,396	-------	301	15	20	-------	9	929	-------	1,758	86	13,078	29	1,620	-------	-------	1,171
New Mexico	-------	411	11	102	12	67	86	3	36	-------	107	84	1,236	14	851	-------	-------	731
Arizona	-------	1,390	2	212	4	-------	1,342	11	456	-------	5,348	236	3,316	16	1,471	-------	2	1,293
Utah	-------	4,084	-------	13	2	3	2	1	752	-------	7,804	93	8,454	17	3,038	11	8	316
Nevada	-------	272	49	7	-------	18	4	5	-------	-------	60	14	1,186	4	121	-------	-------	68
PACIFIC																		
Washington	-------	4,509	115	338	10	62	99	31	903	-------	277	30	12,394	94	4,385	-------	-------	831
Oregon	-------	1,478	1	151	14	-------	23	5	-------	-------	591	78	5,843	45	1,677	-------	-------	833
California	1	26,763	54	1,215	182	275	-------	161	12,651	-------	5,408	1,222	62,922	536	19,472	-------	-------	[8] 2,249
Total	36	225,020	1,104	16,423	4,073	24,164	6,456	664	59,151	15,236	284,138	47,916	681,184	5,597	159,654	1,445	3,891	104,098
Year 1945	44	284,625	1,329	18,606	3,341	34,672	11,125	673	29,222	16,194	511,489	61,707	144,398	8,035	196,317	1,571	3,837	108,777
Median 1941–45	75	299,985	-------	16,421	3,220	30,872	9,421	673	130,417	16,194	476,275	58,917	612,068	8,035	198,264	1,627	4,809	129,021
Alaska	-------	279	1	50	-------	1	3	-------	34	-------	576	-------	302	-------	48	-------	-------	89
Hawaii Territory	-------	888	20	17	14	52	-------	-------	1,368	8	11,874	[9] 149	734	16	257	-------	-------	[8] 124
Panama Canal Zone [10]	-------	177	-------	202	48	51	-------	-------	-------	-------	-------	576	831	11	73	-------	-------	[11] 479

See footnotes on p. 408.

Consolidated monthly State morbidity reports for the year 1946—Continued

Division and State	Poliomyelitis*	Rabies in man	Rheumatic fever	Rocky Mountain spotted fever	Scarlet fever*	Septic sore throat	Smallpox*	Tetanus	Trachoma	Trichinosis	Tuberculosis, all forms*	Tuberculosis, respiratory	Tularemia	Typhoid fever*	Paratyphoid fever	Typhus fever, endemic	Undulant fever*	Vincent's infection	Whooping cough*
NEW ENGLAND																			
Maine	39	-	-	-	1,350	30	-	5	-	5	561	531	-	23	[12] 26	-	37	27	834
New Hampshire	184	-	-	-	739	107	-	-	-	6	191	-	-	8	1	-	33	35	381
Vermont	72	-	-	-	296	16	-	-	-	-	206	-	-	2	2	-	82	45	858
Massachusetts	380	-	-	1	6,103	178	-	12	1	38	3,255	3,068	2	36	177	3	53	-	6,516
Rhode Island	90	-	89	-	460	19	-	2	-	9	481	458	-	5	9	-	16	4	1,423
Connecticut	119	-	-	-	1,579	261	-	4	-	16	1,044	1,004	-	13	13	-	98	-	2,203
MIDDLE ATLANTIC																			
New York	1,424	-	-	16	17,018	-	-	32	-	151	13,366	12,682	6	154	27	16	300	-	9,032
New Jersey	256	2	-	17	4,191	151	2	9	2	19	3,621	-	-	60	29	3	54	-	7,034
Pennsylvania	287	3	820	20	9,347	-	-	11	-	3	3,787	-	6	191	[12] 23	3	116	-	6,464
EAST NORTH CENTRAL																			
Ohio	717	6	107	9	11,750	40	18	12	5	17	5,526	-	32	129	24	2	120	50	4,207
Indiana	433	-	1	12	2,871	197	42	11	2	1	2,730	2,602	77	107	5	1	167	38	1,155
Illinois	2,504	2	316	41	6,300	167	6	33	33	3	6,642	6,054	97	104	[12] 15	-	480	315	5,440
Michigan	1,081	-	358	-	5,976	288	3	26	1	8	5,546	-	21	92	[12] 84	[7] 2	136	-	8,116
Wisconsin	1,273	-	-	-	4,067	118	5	-	1	-	[7] 1,998	-	13	15	2	-	346	-	7,390
WEST NORTH CENTRAL																			
Minnesota	2,875	-	84	1	1,852	597	4	5	-	-	1,978	-	13	25	[12] 22	-	331	82	494
Iowa	634	1	17	2	1,690	93	15	2	1	-	761	-	3	48	-	-	638	9	1,042
Missouri	1,267	-	91	11	1,730	38	10	-	-	-	2,131	-	80	85	4	3	54	-	645
North Dakota	462	-	9	-	280	7	1	-	41	8	202	183	1	21	-	-	11	114	36
South Dakota	[7] 398	-	-	2	389	11	-	-	66	-	276	[13] 35	-	10	-	-	67	3	29
Nebraska	642	-	-	-	1,156	-	6	-	-	-	591	-	3	26	1	-	35	-	186
Kansas	1,046	-	5	-	2,055	28	10	9	15	-	783	769	37	28	3	-	271	153	1,069
SOUTH ATLANTIC																			
Delaware	32	-	-	16	246	1	-	-	-	-	196	196	2	15	-	-	3	-	183
Maryland	109	-	129	46	2,265	117	-	13	-	1	2,764	2,674	14	34	2	2	41	27	1,371
District of Columbia	36	-	-	4	572	-	-	-	-	-	2,620	2,537	6	30	3	1	-	-	383
Virginia	142	-	-	93	2,720	1,734	-	5	1	-	3,760	3,760	77	116	7	6	70	-	3,061
West Virginia	76	-	-	10	1,586	23	1	-	-	-	1,887	-	9	49	3	-	11	-	1,181
North Carolina	160	-	-	66	1,531	51	2	-	-	-	3,472	3,380	45	54	6	82	9	-	3,394
South Carolina	21	-	464	3	303	689	-	10	-	2	448	-	18	79	14	71	40	-	2,056
Georgia	170	1	30	33	500	256	3	15	-	-	1,992	1,975	60	80	65	595	169	102	564
Florida	570	1	-	-	285	146	2	40	-	-	2,119	2,109	4	68	[12] 115	420	96	119	996

EAST SOUTH CENTRAL																			
Kentucky	114			24	1,409	42	5	3	56		2,246	2,228	27	92	5	5	25	9	1,273
Tennessee	180	1	10	33	1,263	196	5	28	2	6	4,603		127	115	10	59	67	237	1,201
Alabama	378	3		6	785		5	38			3,567		16	64		417	102		1,112
Mississippi	335			1	541		9		84		2,248	2,202	68	100		119	132		7,198
WEST SOUTH CENTRAL																			
Arkansas	403	2		1	367	369	9	11	385	2	1,355	1,312	166	106	8	47	74		490
Louisiana	382		201	3	339	426	5	60	1		2,225	2,144	43	176	29	286	64		300
Oklahoma	403	2		28	541	164	16	6	287		2,479		30	51	4	5	36	18	462
Texas	979	3		4	2,194	1,653	28		125		6,322		42	443	61	1,147	750		8,443
MOUNTAIN																			
Montana	129		10	8	344	70	[14] 1	1	65		405	153	15	24			13	10	190
Idaho	48		68	7	369	227	17		14		217		8	28	45		23	89	452
Wyoming	123		1	14	271	67	4		2		32		11	10			4	21	206
Colorado	907		360	10	1,434	1,308	13		2		396			24	9		54	76	1,092
New Mexico	166		1		398	7	2	1	28		[7] 2,511	[7] 2,424		39	4	3	9		526
Arizona	109		3		461	2	1		329	1	1,406			49	5	1	34	4	707
Utah	143		88	4	953	5					180	165	28	2	[12] 5		35		718
Nevada	16		2		137	55	3		13		213		1	1			7	39	73
PACIFIC																			
Washington	522		320	4	1,383	106	88		1		2,262	[15] 279		46	10	1	51	652	1,556
Oregon	156		41	8	1,061	100	1	3	23		712	698		45	15		30		811
California	2,199		890	5	7,619	153	14	63	32	21	9,597	9,005	12	151	74	66	293		4,165
Total	25,191	27	4,515	563	113,076	10,313	356	470	1,618	317	117,910	64,627	1,220	3,273	[12] 966	3,366	5,687	2,278	108,718
Year 1945	13,514	25	4,781	452	174,128	10,112	345	439	1,448	258	115,299	67,786	856	4,221	716	5,180	4,959	3,273	132,814
Median 1941–45	12,429	29		448	142,274	7,787	746	426	2,603	307	115,299	67,786	887	[16] 4,947	[16] 675	4,517	3,639	1,939	191,112
Alaska	1				6	85					527	399	1	2				4	9
Hawaii Territory	25				30	80	[17] 1	8	2		1,477	1,126		9	11	89	4		27
Panama Canal Zone [10]	1				3						[11] 50			11	16	4			[11] 27

See footnotes on p. 408.

FOOTNOTES FOR TABLE ON PAGES 404 TO 407

*Diseases marked with an asterisk (*) are reportable by law or regulation in all the States, including the District of Columbia. Typhoid fever is reportable in all the States; paratyphoid fever in all except 6 States. Syphilis is reportable in all the States and the District of Columbia but is not included in the table. Some States have increased and some have reduced the list of reportable diseases since the latest published compilation of reportable diseases (Pub. Health Rep., Mar. 10, 1944. Reprint No. 2544).

[1] Includes cases of kerato- and suppurative conjunctivitis and of pink eye.
[2] In a few States practically all contracted outside continental United States.
[3] Lobar pneumonia only.
[4] Includes 1 case acquired through blood transfusion.
[5] New York City only.
[6] Acquired through blood transfusion.
[7] Includes nonresidents.
[8] For the month of January only.
[9] Includes off-shipping cases.
[10] Includes the cities of Colon and Panama.
[11] In the Canal Zone only.
[12] Includes cases of salmonella infections.
[13] For 3 months only.
[14] Removed from a troop train.
[15] For 2 months only.
[16] 4-year (1942–45) average.
[17] Off-shipping.

The following list includes certain rare conditions, diseases of restricted geographical distribution, and those reportable in or reported by only a few States; last year's figures in parentheses (where no figures are given, no cases were reported last year):

Actinomycosis: Connecticut 2 (3), Illinois 4 (1), Michigan 2 (5), Minnesota 12 (11), Iowa 3 (1), South Dakota 4, Tennessee 2, Montana 1 (1).
Beriberi: Florida 2.
Botulism: Tennessee 1, New Mexico 7, California 5 (25).
Coccidioidomycosis: New Mexico 2 (4), Arizona 17 (6), California 40 (39).
Colorado tick fever: Wyoming 3 (2), Colorado 31 (33).
Dengue: Maryland 1, North Carolina 1, South Carolina 10 (19), Georgia 1 (2), Florida 2, Mississippi 1 (10), Texas 21 (19), Wyoming 1, Arizona 1, Oregon 1.
Dermatitis: New Hampshire 15 (23), Ohio 1, Missouri 359 (357).
Diarrhea: New York 139, New Jersey 38 (6), Pennsylvania 32, Ohio 581 (1,159) (includes enteritis), Illinois 131 (2), Michigan 5 (15), North Dakota 6, Maryland 102 (136), South Carolina 9,995 (12,300), Florida 52 (42), Montana 1 (18) (includes enteritis), Idaho 1, Colorado 27 (6) (includes enteritis), New Mexico 140 (215), Utah 4 (27), Oregon 35 (6) (includes enteritis), California 160 (43), Alaska 4.
Dog bite: Illinois 12,545 (10,843) (all animal bites), Michigan 8,027 (8,389), Arkansas 697 (469).
Favus: Michigan 3 (1).
Filariasis: New Jersey 1 (2), Minnesota 1 (2).
Food poisoning: Maine 140 (7), New Jersey 6, Ohio 3 (1), Indiana 14 (9), Illinois 35 (105), Kansas 105, Louisiana 23 (22), Idaho 11 (2), New Mexico 2 (1), Nevada 6 (6), Washington 55 (78), Oregon 3, California 424 (483).
Framboesia (yaws): South Carolina 1.
Glanders: Tennessee 1.
Granuloma (unspecified): Ohio 44 (73).
Granuloma inguinale: Missouri 20 (13), Florida 257 (244), Tennessee 98 (69), Mississippi 661 (618), Louisiana 300 (235), Arizona 3, Utah 2.
Impetigo contagiosa: New York 141, Ohio 29 (5), Indiana 100 (51), Illinois 43 (75), Michigan 1,304 (1,224), Iowa 1 (8), Missouri 5 (14), North Dakota 22 (5), Kansas 27 (55), Maryland 9 (38), Kentucky 14, Montana 41 (56), Idaho 65 (20), Wyoming 37 (25), Colorado 47 (50), Nevada 196 (121), Washington 936 (806), Hawaii Territory 27 (93).
Jaundice (including hepatitis and Weil's disease): Maine 19 (9), New York 409 (1), Pennsylvania 40, Ohio 6 (1), Indiana 63 (89), Illinois 90 (339), Michigan 33 (142), Minnesota 61 (16), Iowa 1 (15), North Dakota 7, Nebraska 2, Kansas 4 (80), Maryland 16 (20), South Carolina 6 (140), Florida 27 (23), Tennessee 7, Louisiana 4 (5), Montana 12 (7), Idaho 39 (40), Utah 23 (26), Washington 53 (84), Oregon 76 (20), California 279 (343). Alaska 4 (22), Hawaii Territory 9 (210).
Lead poisoning: Minnesota 1 (7), New Mexico 1 (1).
Leprosy: New York 2 (1), Illinois 1 (2), Michigan 2, Florida 8, Louisiana 4 (8), Texas 8 (5), Colorado 1, Washington 1 (1), California 7 (17), Hawaii Territory 33 (26), Panama Canal Zone 1.
Lymphocytic choriomeningitis: Massachusetts 4 (4), Tennessee 21 (31).
Lymphogranuloma venereum: Missouri 31 (25), Florida 175 (183), Tennessee 140 (87), Louisiana 106 (170), Utah 9 (6), Nevada 1.
Psittacosis: Massachusetts 2, New York 1 (4), Illinois 7 (2), Michigan 4, North Carolina 1, Washington 2, California 6 (3).
Puerperal septicemia: Ohio 1, Florida 3 (1), Tennessee 4 (2), Mississippi 239 (181), Louisiana 13 (36), New Mexico 3 (1), Nevada 3 (1).
Rabies in animals: Maine 1, New Hampshire 1, Massachusetts 2, New York 1,161 (576), Pennsylvania 6, Ohio 886 (785), Illinois 363 (421), Michigan 12 (35), Iowa 57 (69), Missouri 15 (35), Kansas 28 (15), Delaware 1, Maryland 30 (38), District of Columbia 4 (109), West Virginia 2, South Carolina 154 (131), Florida 62 (7), Alabama 712 (600), Arkansas 159 (184), Louisiana 45 (106), Texas 1,034 (838), Colorado 7, New Mexico 12 (10), Utah 12 (22), Oregon 1, California 402 (581).
Rat bite fever: Georgia 1, Tennessee 4 (1), Louisiana 1 (5).
Relapsing fever: Pennsylvania 3 (1), Texas 29 (18), Idaho 2, Arizona 2, Nevada 2 (16), California 17 (5), Panama Canal Zone 3.
Ringworm disease: Pennsylvania 1,543 (991), Ohio 185 (4), Indiana 488 (9), Illinois 1,891 (1,399), Michigan 1,385 (2,055) Minnesota 146 (691), Iowa 37 (8), Missouri 7 (112), Kansas 7 (23), Maryland 2, Montana 6 (11). Idaho 77 (9), Wyoming 2, Utah 250, Nevada 2 (13), Washington 689 (486).
Scabies: Rhode Island 2, Pennsylvania 567 (114), Ohio 18 (1), Indiana 1 (4), Michigan 1,241 (883), Missouri 41 (7), North Dakota 16 (27), Kansas 123 (93), Maryland 5 (28), Kentucky 25, Montana 73 (100), Idaho 203 (60), Wyoming 8 (7), Arizona 1, Nevada 74 (83).
Silicosis: Maine 1, New Hampshire 4, Idaho 3 (3), New Mexico 10 (6), Utah 1 (5).

WEEKLY REPORTS FROM CITIES [1]

City reports for week ended February 15, 1947

This table lists the reports from 91 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0		0		1	1	0	3	0	0	4
New Hampshire:												
Concord	0	0		0		0	2	0	1	0	0	
Vermont:												
Barre	1	0		0	18	0	0	0	0	0	0	4
Massachusetts:												
Boston	9	0		0	12	2	13	0	24	0	0	42
Fall River	0	0		0	5	0	1	0	1	0	1	3
Springfield	1	0		0	6	0	0	0	2	0	0	7
Worcester	0	0		0	2	0	5	0	9	0	0	22
Rhode Island:												
Providence	1	0		0	95	0	2	0	8	0	0	22
Connecticut:												
Bridgeport	0	0		0	12	0	0	0	5	0	0	
Hartford	0	0		0	1	0	0	0	3	0	0	
New Haven	0	0		0	44	0	0	0	11	0	0	2
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0	1	0	1	3	2	0	9	0	0	3
New York	10	1	12	1	65	6	66	0	128	0	2	38
Rochester	0	0		0	5	0	1	0	10	0	0	1
Syracuse	0	0		0		0	5	0	8	0	0	8
New Jersey:												
Camden	1	0		0		0	1	0	6	0	0	
Newark	0	0		0		0	3	0	11	0	0	16
Trenton	0	0		0	29	0	2	0	8	0	0	1
Pennsylvania:												
Philadelphia	3	0	3	0	4	2	25	0	53	0	0	41
Pittsburgh	0	0		0	116	1	12	0	18	0	0	18
Reading	0	0		0	2	0	1	0	3	0	0	3
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	1	0	1	0	1	0	3	0	10	0	0	4
Cleveland	0	0	2	1	315	1	11	0	37	0	0	15
Columbus	1	0	1	1	1	0	2	0	7	0	0	10
Indiana:												
Fort Wayne	0	0		0	6	0	3	1	0	0	0	1
Indianapolis	5	0		1		0	8	1	24	0	0	25
South Bend	0	0		0	1	0	0	0	0	0	0	
Terre Haute	0	0		0		0	1	0	1	0	0	
Illinois:												
Chicago	0	0	1	0	38	5	37	0	62	0	0	46
Springfield	0	0		0		0	3	0	3	0	0	
Michigan:												
Detroit	2	0		1	3	0	14	1	55	0	0	103
Flint	0	0		0		0	2	0	4	0	0	2
Grand Rapids	0	0		0	1	0	3	0	5	0	0	7
Wisconsin:												
Kenosha	0	0		0		0	0	0	4	0	0	
Milwaukee	0	0		0	9	0	7	0	10	0	0	40
Racine	0	0		0	1	0	0	0	1	0	0	4
Superior	0	0		0		0	0	0	1	0	0	
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0		0		0	0	0	0	0	0	
Minneapolis	1	0		0	6	0	6	0	10	0	0	7
St. Paul	0	0		0	10	0	3	0	4	0	0	2
Missouri:												
Kansas City	1	0		0		0	6	0	10	0	0	1
St. Joseph	0	0		0		0	0	0	0	0	0	2
St. Louis	3	0	3	1	3	0	18	0	6	0	0	5

[1] In some instances the figures include nonresident cases.

City reports for week ended February 15, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
North Dakota:												
Fargo	0	0	------	0	------	0	1	0	0	0	0	------
Nebraska:												
Omaha	1	0	------	0	------	0	1	0	6	0	0	------
Kansas:												
Topeka	0	0	------	0	1	0	1	0	5	0	0	------
Wichita	1	0	------	0	------	0	4	0	3	0	0	4
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0	------	0	1	0	1	0	5	0	0	7
Maryland:												
Baltimore	4	0	3	1	6	1	11	1	15	0	0	52
Cumberland	0	0	------	0	6	0	1	0	0	0	0	------
Frederick	0	0	------	0	------	0	0	0	0	0	0	------
District of Columbia:												
Washington	0	0	2	1	13	0	6	1	13	0	0	8
Virginia:												
Lynchburg	0	0	------	0	------	0	0	0	0	0	0	5
Richmond	1	0	------	0	58	0	2	0	6	0	0	------
Roanoke	0	0	------	0	3	0	0	0	9	0	0	------
West Virginia:												
Charleston	0	0	------	0	------	0	0	0	3	0	0	------
Wheeling	0	0	------	0	------	0	1	0	1	0	0	2
North Carolina:												
Raleigh	0	0	------	0	1	0	0	0	0	0	0	------
Wilmington	1	0	------	0	3	0	3	0	0	0	0	------
Winston Salem	0	0	------	0	43	0	2	0	4	0	0	2
South Carolina:												
Charleston	0	0	13	0	2	0	2	0	0	0	0	------
Georgia:												
Atlanta	0	0	4	2	2	0	7	0	10	0	0	------
Brunswick	0	0	------	0	1	0	0	0	0	0	0	------
Savannah	0	0	1	0	50	0	1	1	0	0	0	3
Florida:												
Tampa	3	0	1	0	------	0	1	0	2	0	0	2
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	1	0	------	0	3	0	11	0	9	0	0	10
Nashville	0	0	------	0	------	0	3	0	3	0	0	------
Alabama:												
Birmingham	0	0	1	1	------	0	5	0	3	0	0	------
Mobile	0	0	------	0	4	0	2	0	0	0	0	------
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	------	0	2	0	1	0	0	0	0	3
Louisiana:												
New Orleans	3	0	16	2	3	2	4	0	1	0	3	------
Shreveport	0	0	------	0	------	0	4	0	0	0	0	------
Oklahoma:												
Oklahoma City	1	0	1	0	1	1	3	0	6	0	0	------
Texas:												
Dallas	0	0	1	1	------	0	0	0	1	0	0	9
Galveston	0	0	------	0	------	0	2	0	2	0	1	1
Houston	0	0	------	0	------	0	3	0	0	0	0	------
San Antonio	2	0	------	1	------	0	7	1	0	0	0	4
MOUNTAIN												
Montana:												
Billings	0	0	------	0	------	0	3	0	0	0	0	------
Great Falls	0	0	------	0	175	0	0	0	0	0	0	------
Helena	0	0	------	0	15	0	0	0	0	0	0	1
Missoula	0	0	------	0	------	0	0	0	2	0	0	------
Idaho:												
Boise	0	0	------	0	------	0	1	0	0	0	0	------
Colorado:												
Denver	6	0	37	1	10	1	8	0	22	0	0	7
Pueblo	1	0	------	0	------	0	0	0	8	0	0	------
Utah:												
Salt Lake City	0	0	------	0	4	0	0	0	4	0	0	------

City reports for week ended February 15, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle	1	0		1	1	0	6	0	6	0	0	3
Spokane	0	0		0		0	1	1	5	0	0	
Tacoma	0	0		0	2	0	0	0	0	0	0	4
California:												
Los Angeles	14	0	5	0	4	0	2	6	22	0	0	23
Sacramento	0	0		0	1	1	0	0	3	0	0	4
San Francisco	2	0	1	1	1	1	5	1	22	0	0	1
Total	82	1	110	18	1,228	28	380	15	776	0	7	664
Corresponding week, 1946*	115		244	41	6,089		502		1,000	0	12	501
Average 1942-46*	74		244	[2] 49	[3] 4,208		[2] 490		1,521	1	11	710

[2] 3-year average, 1944-46. [3] 5-year median, 1942-46. *Exclusive of Oklahoma City.

Anthrax.—Cases: Camden, 1.
Dysentery, amebic.—Cases: Boston, 1; New York, 3; Philadelphia, 3; St. Louis, 1; Memphis, 2.
Dysentery, bacillary.—Cases: New York, 2; Detroit, 1.
Dysentery, unspecified.—Cases: San Antonio, 5.
Tularemia.—Cases: Washington, D. C., 1.
Typhus fever, endemic.—Cases: New York, 1; Charleston, S. C., 1; Tampa, 3; Mobile, 1; Los Angeles, 2.

Rates (annual basis) per 100,000 population, by geographic groups, for the 91 cities in the preceding table (latest available estimated population, 34,631,100)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England	31.4	0.0	0.0	0.0	510	7.8	62.7	0.0	175	0.0	2.6	277
Middle Atlantic	6.5	0.5	7.4	0.5	103	5.6	54.6	0.0	118	0.0	0.9	60
East North Central	5.5	0.0	3.0	2.4	229	3.6	57.2	1.8	136	0.0	0.0	156
West North Central	13.9	0.0	6.0	2.0	40	0.0	69.6	0.0	88	0.0	0.0	42
South Atlantic	14.7	0.0	39.2	6.5	309	1.6	62.1	4.9	111	0.0	0.0	132
East South Central	5.9	0.0	5.9	5.9	41	0.0	123.9	0.0	89	0.0	0.0	59
West South Central	15.2	0.0	45.7	10.2	15	7.6	61.0	2.5	25	0.0	10.2	43
Mountain	55.6	0.0	293.9	7.9	1,620	7.9	95.3	0.0	286	0.0	0.0	64
Pacific	26.9	0.0	9.5	3.2	14	3.2	22.1	12.7	92	0.0	0.0	55
Total	12.4	0.2	16.6	2.7	185	4.2	57.4	2.3	117	0.0	1.1	100

TERRITORIES AND POSSESSIONS

Puerto Rico

Notifiable diseases—4 weeks ended January 25, 1947.—During the 4 weeks ended January 25, 1947, cases of certain notifiable diseases were reported in Puerto Rico as follows:

Disease	Cases	Disease	Cases
Chickenpox	33	Poliomyelitis	20
Diphtheria	41	Syphilis	181
Dysentery, unspecified	5	Tetanus	10
Gonorrhea	146	Tuberculosis (all forms)	543
Influenza	97	Typhoid fever	12
Malaria	322	Typhus fever (murine)	3
Measles	10	Whooping cough	62

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended February 1, 1947.—During the week ended February 1, 1947, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		15	2	240	322	19	38	37	78	751
Diphtheria	1	4		23	7	1		2		38
Dysentery:										
Amebic					6					6
Bacillary									4	4
German measles					23	2		5	7	37
Influenza		2			12	4			2	20
Measles		132	2	91	70	174	102	238	506	1,315
Meningitis, meningococcus			1	2	2	1			1	7
Mumps		1	1	95	568	38	183	31	221	1,138
Poliomyelitis				4	1					5
Scarlet fever		7	1	82	83	9	1	2	9	194
Tuberculosis (all forms)		14	29	63	18	7	12	5	32	180
Typhoid and paratyphoid fever		1		6	1					8
Undulant fever				1	4			4	3	12
Venereal diseases:										
Gonorrhea		18	13	152	110	32	20	56	81	482
Syphilis	3	12	5	81	83	16	15	14	35	264
Other forms							1			1
Whooping cough		4	3	36	69	16	13	7	12	160

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

Indochina (French)—Cambodia.—For the month of January 1947, 230 cases of cholera with 147 deaths were reported in Cambodia, French Indochina.

Smallpox

Indochina (French).—For the month of January 1947, 373 cases of smallpox with 152 deaths were reported in French Indochina.

Typhus Fever

Bulgaria.—For the period January 15–21, 1947, 43 cases of typhus fever with 6 deaths were reported in Bulgaria.

Eritrea.—For the week ended February 1, 1947, 30 cases of typhus fever with 5 deaths were reported in Eritrea.

Rumania.—For the week ended January 25, 1947, 400 cases of typhus fever, including 14 cases reported in Bucharest, were reported in Rumania.

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Public Health Reports

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SIMPLIFIED APPRAISAL OF DENTAL-HEALTH PROGRAMS

By John W. Knutson, *Senior Dental Surgeon, Dental Section, States Relations Division, United States Public Health Service;* Cecelia Maday, *Dental Health Advisor, Minnesota Department of Health;* and William A. Jordan, *Dental Director, Minnesota Department of Health*

Several methods which might be used in appraising community dental-health programs, and discussions on the relative merits of each method have been reported (*1, 2, 3, 4, 5, 6, 7, 8, 9*). This paper is concerned primarily with the presentation of a simplified procedure for evaluating a county-wide dental program for school children. The procedure is designed to afford determinations, by age, of dental-caries prevalence, and of tooth mortality in the permanent teeth of school children. Evaluation is dependent on periodic comparisons of these determinations. The method used to obtain prevalence of dental caries is based on the observation (*10*) that a functional relationship exists between the proportion of children having at least one DMF (decayed, missing or filled) permanent tooth and the average number of DMF permanent teeth per child. Age-specific-tooth mortality rates are obtained from actual counts of permanent teeth which have been extracted or are indicated for extraction. Use of the simplified method of appraisal is illustrated by application to a county-wide dental program which has been in operation for more than 5 years. Although the technique of evaluation is not dependent on the means employed to improve dental health, a brief review of the conditions and procedures under which the program operated seems to be indicated.

THE NICOLLET COUNTY DENTAL PROGRAM

At the beginning of the 1940–41 school year, a dental program, which was sponsored by the Minnesota Department of Health in cooperation with the United States Public Health Service, was inaugurated in Nicollet County, Minnesota. The broad objective of

this program was to improve the dental health of the school children. One of the specific purposes of this undertaking, however, was to develop and test simplified program records and techniques of evaluation. The means used to bring about an improvement in dental health was to advocate and promote at least one dental examination per year, supplemented by the necessary dental treatment for each school child. School teachers and principals were encouraged to participate in this effort. In January 1942, a dental-health advisor was assigned to the program to work in cooperation with the county nurse, and to assist the teachers in attaining in their own classrooms the yearly goal of a dental examination and necessary dental treatment for each child. Through the financial assistance of the county welfare board, dental care was made available to children of dependent mothers and of families who were relief clients.

Nicollet County comprises an area of 459 square miles, and in 1940, its population was 18,282. At that time there were 10 dentists practicing in the county, one of whom was employed full time at the St. Peter State Hospital. Since June 1942, three of the dentists have served in the armed forces for an average of 3 years. St. Peter, the largest town in the county, with a population of 5,870 in 1940, is the county seat. There are three smaller towns, but the population of the county is predominantly rural. In addition to the public and parochial town schools, there were, at the beginning of the 1940–41 school year, 44 rural district schools with enrollments ranging from 4 to 27 children.

To facilitate a periodic check during each school year on the effectiveness of application of the means used to attain the objective of the dental program, a Dental Health Report Card (*5*) was provided yearly for each school child. This card contained spaces for the name of the child and for the dentist's signature upon completion of the necessary dental care. The completed card was returned by the child to his school teacher. The use of this card during the school year immediately preceding the inauguration of the special demonstration program indicated that 26 percent of the children enrolled in the elementary grades (through the eighth grade) had received complete dental care. Thereafter, the percentage of children who received complete dental treatment increased progressively from 53.8 for the school year ending June 1941 to 79.1 for the school year ending June 1946.

The use of the Dental Health Report Card system indicated that the percentage of children who received a dental examination and necessary dental treatment at least annually was increased markedly under the program. However, evaluation by this system alone, as measured by increases in the proportion of children who received annual dental

examination and care, does not necessarily provide an objective measure of improvement in dental health. It merely affords a measure of the frequency with which the means chosen to improve dental health has been applied. One of the prime purposes of promoting periodic examination and timely dental-treatment services for children is the early detection and treatment of carious teeth in order to prevent tooth loss. Therefore, a specific measure of the effectiveness of the dental program itself is afforded by periodic tooth-loss rates which may be used comparatively to determine the reduction in tooth loss accomplished under the program.

BASE-LINE DATA

During the fall of 1940, detailed dental examinations were made of the children enrolled in the elementary and high-school grades of all schools, parochial and public, of Nicollet County. The method of examination has been described in detail in a previous report (*11*). Of the 2,627 children (aged 6 to 18 years) examined, 2,064 (78.6 percent) were enrolled in public and 563 (21.4 percent) in parochial schools. About two-fifths of these children were attending rural schools, 918 being enrolled in the 44 rural public schools and 202 in the 5 rural parochial schools.

The examinations were made by one of us (J.W.K.) with the assistance of a recorder, and were completed in a 2-month period. Decoding and processing of the dental-examination records required a minimum of 3 clerk-months. Analysis of the findings indicated that the average incidence of dental decay in the permanent teeth of Nicollet County school children was slightly less than one tooth attacked per child per year, and that roughly two-thirds of the DMF (decayed, missing, or filled) teeth had been filled (*5*). Thus, by comparison with findings among children in other communities surveyed, such as Hagerstown, Maryland, for example (*5*, *11*), the level of dental care was relatively high at the beginning of the program.

EVALUATION TECHNIQUE

In May 1946, after more than 5 years of operation of the program, a determination of the dental status of the Nicollet County school children was undertaken again. This time, however, an effort was made to set up an examination form from which sufficient comparative data could be derived to evaluate the program adequately, and at the same time to shorten as much as possible the examination and tabulation time involved. The information secured for each child was as follows:

1. Name, age, and sex.
2. Are there one or more DMF permanent teeth in the mouth?
3. Are there one or more fillings in permanent teeth?

4. Are there one or more fillings in deciduous teeth?
5. How many permanent teeth are indicated for extraction? (Specify tooth or teeth indicated for extraction.)
6. How many permanent teeth have been extracted? (Specify tooth or teeth extracted.)
7. What is the total number of missing teeth? (Permanent teeth indicated for extraction plus those extracted.)
8. Qualifying remarks.

Questions 2, 3, and 4 were answered by a "plus" or a "nought" sign, the examiner calling out one or the other to the recorder in answer to each of these questions as he examined each child's teeth. Questions 5 and 6 were used to specify, by position in the mouth, teeth indicated for extraction or already extracted, and question 7 to indicate the total number of teeth specified under questions 5 and 6. Space for remarks provided for qualifying notes, such as "tooth congenitally missing," "tooth lost because of severe trauma," and for notes on other special conditions. The form used in making the survey is reproduced in figure 1.

DENTAL SURVEY

COUNTY Nicollet SCHOOL District No. 39 EXAMINER M. A. Jordan
CITY Rural ADDRESS ______ DATE 4-24-46

NAME OF PUPIL	AGE	SEX	PERMANENT TEETH (EXCEPT FOR FILLINGS)						REMARKS
			DMF	FILLINGS		MISSING			
				P	D	EXTRACTION INDICATED	EXTRACTED	TOTAL	
Jones, Mary	9	F	+	+	+	0	0	0	
Smith, Jane	9	F	0	0	0	0	0	0	
White, Peter	9	M	+	0	0	6|	|6	2	
Black, John	9	M	+	+	0	0	0	0	2| Congenitally missing
Mans, Vern	9	M	+	0	0	0	6|6	2	
Lee, James	9	M	+	+	+	|6	0	1	

FIGURE 1.

The examination of 2,310 children by this abbreviated procedure was completed in 3 days by three teams of examiners. Each examining team consisted of a dentist and a recorder. Although one such team can examine approximately 125 children per hour, a considerable amount of travel time was involved in visits to each of the rural schools as well as to each of the schools in urban centers. Processing and final tabulation of the data were completed in less than 1 clerk-week. Examinations were made of the children in 40 of the 42 rural public schools and in the 4 rural parochial schools, as well as in the public and parochial schools in the urban centers of the county.

COMPARISON OF FINDINGS 1940–1946

The proportions of children, by age, having one or more decayed permanent teeth, for the years 1940 and 1946, are presented in figure 2.

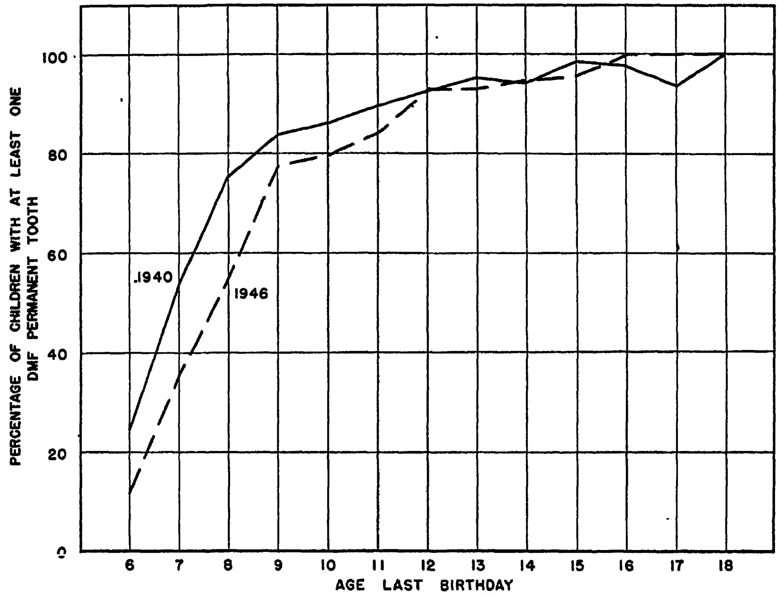

FIGURE 2.—Percentage of children with at least one DMF (decayed, missing or filled) permanent tooth, by age, for 2,627 Nicollet County, Minnesota, school children in 1940 and 2,310 in 1946.

Comparison indicates that the percentages are consistently lower for children aged 6 through 11 years for 1946 than for 1940, but that they are strikingly similar for children aged 12 to 18 years. The 1940 findings are based on the results of dental examinations made with the aid of a mouth mirror and explorer, whereas those for 1946 were obtained with the aid of a tongue blade only. Therefore, the differences in the proportions of children having one or more DMF permanent teeth for children aged 6 to 11 years are most likely a reflection of the difference in the technique of examination rather than a true difference in the caries attack rate. The similarity of the proportions for children aged 12 to 18 is in accord with this conclusion, because at this age level relatively few children experience their first perceptible caries in permanent teeth. Since there is more evidence of caries among the children aged 12 to 18 years than among children in the younger age classes, the explorer and mirror are much more frequently needed to diagnose the first objective sign of caries in the permanent teeth of the latter group. Thus, it is presumed that no real difference exists between the caries incidence in 1946 and that in 1940, with the reservation that this conclusion would be more justifiable if identical techniques of examination had been used. The correctness of this

conclusion, however, is of no great importance to the purposes of this presentation. The simplified technique, as used to obtain the 1946 findings on caries prevalence, is advocated for general use, both for obtaining base-line data and data for subsequent comparisons.

Comparison of the tooth-loss or tooth-mortality rates, which are based on extracted permanent teeth plus permanent teeth indicated for extraction, is presented in figure 3. It will be noted that the

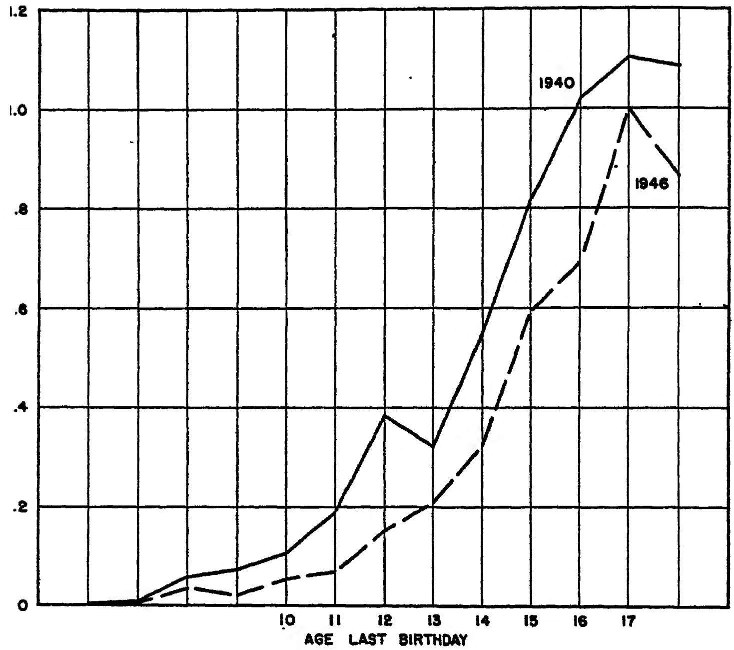

FIGURE 3.—Tooth mortality, by age, for 2,627 Nicollet County, Minnesota, school children in 1940 and 2,310 in 1946.

tooth-mortality rates are consistently lower in 1946 than in 1940. The over-all reduction is approximately 30 percent. The appreciable reduction in tooth-mortality rates accomplished by the program in a period of less than 6 years is objective evidence of the effectiveness of the program in accomplishing its purpose. The result is particularly gratifying in view of the fact that the tooth-loss rates for children in Nicollet County in 1940 were approximately half those for Hagerstown children examined in the spring of 1937. This difference was due to a relatively high level of dental care among Nicollet County children at the beginning of the program (*5*).

Information on the proportions of children having one or more filled permanent teeth and of children with one or more filled deciduous teeth is not essential to the appraisal. However, because of the ease with which these data can be obtained, without appreciably increasing

the time necessary to collect the essential information, they were collected simultaneously. Comparisons of the findings on fillings for 1940 and 1946 are presented in figures 4 and 5. These comparisons

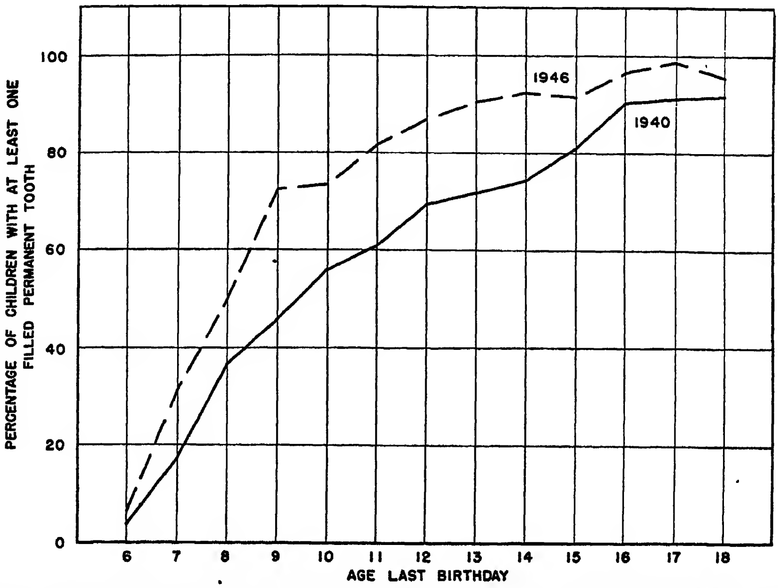

FIGURE 4.—Percentage of children with at least one filled permanent tooth, by age, for 2,627 Nicollet County Minnesota, school children in 1940 and 2,310 in 1946.

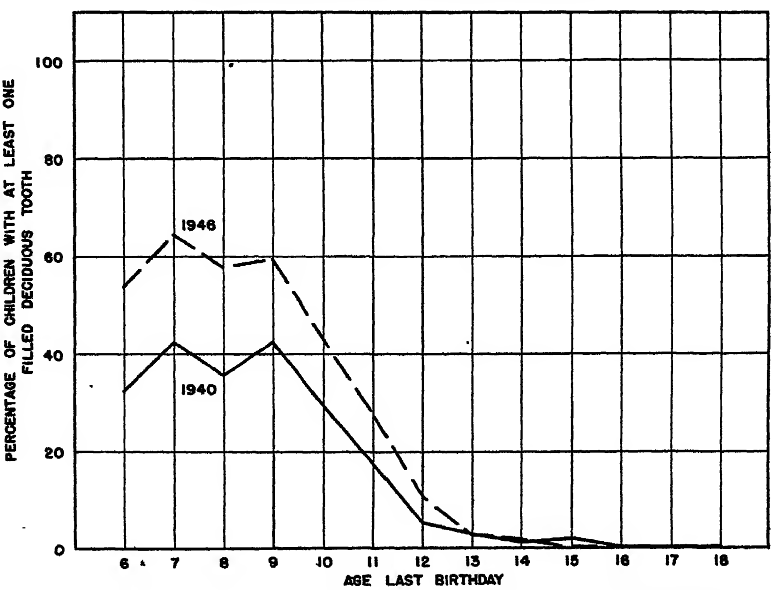

FIGURE 5.—Percentage of children with at least one filled deciduous tooth, by age, for 2,627 Nicollet County Minnesota, school children in 1940 and 2,310 in 1946.

TABLE 1.—*Number of children examined, by age, and number and percentages of children affected by specified dental conditions, among 2,677 children in 1940 and 2,310 in 1946, for Nicollet County, Minnesota*

Year	Age last birthday (in years)												
	6	7	8	9	10	11	12	13	14	15	16	17	18
	Age distribution of children												
1940	259	252	276	282	276	265	289	231	159	142	93	79	24
1946	164	269	235	252	219	247	207	235	172	120	91	77	22
	Number of children with at least one DMF [1] permanent tooth												
1940	63	135	208	237	238	238	268	220	150	140	91	74	24
1946	19	95	129	195	175	208	192	219	163	115	91	77	22
	Percentage of children with at least one DMF [1] permanent tooth												
1940	24.3	53.6	75.4	84.0	86.2	89.8	92.7	95.2	94.3	98.6	97.8	93.7	100.0
1946	11.6	35.3	54.9	77.4	79.9	84.2	92.8	93.2	94.8	95.8	100.0	100.0	100.0
	Number of missing [2] permanent teeth												
1940	1	2	16	20	29	50	111	74	87	116	95	87	26
1946	0	1	9	5	12	17	31	49	64	71	63	77	19
	Number of missing [2] permanent teeth, per child												
1940	.004	.008	.058	.071	.105	.189	.384	.320	.547	.817	1.002	1.101	1.083
1946	.000	.004	.038	.020	.055	.069	.150	.209	.327	.592	.692	1.000	.864
	Number of children with at least one filled permanent tooth												
1940	10	43	101	129	154	161	200	166	118	115	84	72	22
1946	10	83	117	182	160	202	180	213	159	110	88	76	21
	Percentage of children with at least one filled permanent tooth												
1940	3.9	17.1	36.6	45.7	55.8	60.8	69.2	71.9	74.2	81.0	90.3	91.1	91.7
1946	6.1	30.9	49.8	72.2	73.1	81.8	87.0	90.6	92.4	91.7	96.7	98.7	95.5
	Number of children with at least one filled deciduous tooth												
1940	84	107	99	119	82	47	16	7	2	3	0	0	0
1946	88	173	136	149	94	68	22	7	3	0	0	0	0
	Percentage of children with at least one filled deciduous tooth												
1940	32.4	42.5	35.9	42.2	29.7	17.7	5.5	3.0	1.3	2.1	0.0	0.0	0.0
1946	53.7	64.3	57.9	59.1	42.9	27.5	10.6	3.0	1.7	0.0	0.0	0.0	0.0

[1] Decayed, missing or filled teeth. A tooth both decayed and filled is counted as one DMF tooth.
[2] Extracted teeth and teeth indicated for extraction.

indicate that the percentages of children showing objective evidence of dental care, in the form of filled permanent and filled deciduous teeth, respectively, were consistently higher in 1946 than in 1940. Approximately 20 percent more of the children examined in 1946 exhibited at least one filled permanent tooth than did children examined

in 1940. In excess of 50 percent more of the children aged 6 to 12 examined in 1946 exhibited at least one filled deciduous tooth than did children of the same age classes examined in 1940.

SUMMARY

A simple procedure for evaluating a dental program has been described. The use of the method has been illustrated by its use in the appraisal of a dental program which had been in operation for a period of 5½ years. The essential information collected for purposes of evaluation included: the number of children, by age, having one or more DMF permanent teeth, and the number of extracted permanent teeth and teeth indicated for extraction, by age of child. Since it has been demonstrated (*10*) that the prevalence of dental caries and the proportion of children having at least one carious permanent tooth are closely associated, the latter can be used to estimate the level of caries prevalence in the teeth of school children. For purposes of evaluating a treatment program, it is essential that the comparability of the periodically collected data be established, so that changes in tooth-loss rates may be attributed to the treatment program rather than to changes in the rate of caries attack. On the other hand, if the program is designed to prevent dental caries, then success should be reflected in reduced percentages of children with one or more DMF permanent teeth.

Supplemental information which may be collected readily, and which affords complementary data on the effectiveness of a dental-treatment program, is the number of children, by age, who show objective evidence of having one or more filled permanent teeth and the number who have one or more filled deciduous teeth.

For the purposes of the evaluation, all the elementary grade and high-school children of Nicollet County, a rural county in Minnesota, were examined within the equivalent of 9 days by a team consisting of a dentist and a recorder. The data on the 2,310 children examined were processed for analysis in less than 1 clerk-week. Thus, the technique of evaluation meets the very practical criterion of being not only reliable but simple and relatively rapid of application.

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SHADOWED REPLICAS OF GROUND SECTIONS THROUGH TEETH [1]

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In previous publications (*1*, *2*) it has been shown that considerable information can be obtained concerning the fine structure of tooth surfaces through the microscopic study of their metal-shadowed collodion replicas. This technique further provides a new approach to the study of histological structures appearing in longitudinal and cross sections through teeth without the thin-sectioning required by standard procedures. Many of the structures found on replicas of these sections are, as would be expected, the same as those observed in thin sections, but it is apparent from preliminary investigations that much can be demonstrated that is new about the internal fine structure of teeth.

Shadowed replicas of tooth sections were made in the following manner: Sections for study were obtained by the conventional grinding methods described by others (*3*, *4*, *5*). These methods consist of grinding to the desired level with abrasive wheels of various coarseness under running water, followed by rough polishing on a lap covered with abrasives and final polishing on a series of polishing slabs or with ragwheels impregnated with tripoli and rouge. These polished sections are then etched with various acids to bring out their structures. Replicas are taken both before and after etching by covering the sections with an appropriately diluted collodion solution and stripping off the dried films that form. The elevations and depressions in the replicas are made evident for microscopy by the oblique evaporation onto them of a semitransparent film of metal (*6*).

The illustrations in this paper are representative photomicrographs of shadowed replicas of ground sections of teeth etched with various acids to demonstrate the histological detail made evident by this

[1] From the Division of Physiology, Dental Research Section, and Industrial Hygiene Research Laboratory, National Institute of Health.

procedure. Ground sections for the photomicrographs were etched with dilutions of hydrochloric, nitric, citric, and lactic acids ranging in concentration from 0.1 N. to 5.0 N., the exposure time to acid in all instances being 5 seconds. As can be seen from the photographs, the microscopic details that become visible depend on the choice of acid-concentration and type of acid (weak or strong). These differences will be the subject of more detailed future study.

The replicas shown in figures 1 and 2 were photographed directly in a photoenlarger in order to provide a convenient way of identifying the regions photographed on other similarly ground teeth at higher magnifications. The reference numbers on these first figures indicate the regions shown in the correspondingly numbered photomicrographs. The replica shown in figure 1 was taken from an upper premolar which had been ground longitudinally to approximately the center of the pulp chamber. Figure 2 shows the replica of an upper molar ground transversely to a point just below the bottom of the occlusal fissures and at the base of the cusps.

A longitudinal section through enamel (see fig. 1) etched with 0.4 N. HCl yielded the replica shown in figure 3. The individual rod outlines can be seen, as well as the ends of many rod segments which were cut as they left the plane of the section. Components of the enamel structure were more clearly defined when less concentrated inorganic acid (e. g., 0.1 N. HCl) was used. Figures 4 and 5 show the result of such a weaker etch. In these areas the rods run in two directions to give the typical appearance of Shreger's lines. It is worthy of note that the interprismatic substance has been etched to a greater degree than the rods themselves. This can best be seen from a study of the shadows cast by the thin projections arising between the rods. These elevations on the replica correspond to depressions in the section and represent regions where the enamel structure is more susceptible to the action of acid.

The enamel in transversely cut section, shown in figures 6 and 7 (see fig. 2), was etched with 0.1 N. HCl. Evidently zones in the enamel structure vary considerably in their resistance to acid. At many points in the center of a rod the etch was deeper than at nearby points. Narrow regions at the periphery of a rod were most deeply etched, whereas another area between the rods was more deeply etched than the rods themselves but less than the regions at the periphery. This differentiation was lost through the action of stronger inorganic acids which resulted in shadows long enough to obscure and confuse much of the detail at the edges of the rods.

Exposure of dentin to acid reveals a narrow zone at the *dentino-enamel junction* that appears more resistant to etch than the central portion. This region can be seen in figure 2 (at A) and figure 8 (at

DEJ), which is from a replica of a transverse section treated with 3.2 N. HCl.

The replicas shown in figures 9, 10, and 11 were taken from *longitudinal sections of dentin*, also etched with 3.2 N. HCl. Although much of the fine detail was lost by using such strong acid, certain structural details were brought out very clearly. Thus, the distribution and curvatures of the tubules are evident in figure 9, and the pattern of susceptibility to acid seen in figures 10 and 11 suggests the contour lines of Owen. These cross striations point to restricted regions in the dentin which were more deeply etched than the rest.

The fine structure of *transversely sectioned dentin* is best revealed by exposure to dilute organic acids. The replicas shown in figures 12 and 13, taken from dentin which was treated with 0.4 N. citric acid, point to definite differences in susceptibility to etch between the matrix, the periphery of the tubule, and the region between the central projection and the periphery of the tubule. The projection from the center of each tubule, which produces the long narrow shadow, is difficult to interpret at this time; it is in the position supposedly occupied by Tomes' fibril. A study of replicas taken before etching demonstrates that the deep channels in the dentin responsible for these spikes were not present before the acid treatment.

Figure 14 was taken from a replica of *transversely sectioned dentin* etched with 1.6 N. HCl. Here the depth to which the tubules were etched was considerably greater, and much of the fine detail can no longer be seen. Dentin was so rapidly damaged by even the more dilute inorganic acids that it rarely provided replicas flat enough so that an entire field could be brought into focus even under low-power microscopic objectives.

The action of strong acid, such as 3.2 N. HCl, on *transversely sectioned dentin* exposed a matted network of long fibrous strands (figs. 15 and 16). This network is much more pronounced toward the central portion of the dentin and is seldom seen immediately adjacent to or in the zone near the dentino-enamel junction. Further study of these structures is necessary before conclusions can be drawn regarding their significance.

From the foregoing discussion it is obvious that this method of study makes feasible a variety of instructive investigations. Thus, many serial sections through a tooth can be made by progressively repolishing to remove the previously etched tooth substance, which ordinarily is only a few microns thick. In this way a particular structural detail can be identified on successive sections and its three-dimensional configuration fully determined in a single tooth. Corrosion produced by various types of acid in different concentrations can be studied with especial ease and directness, as can also the effect

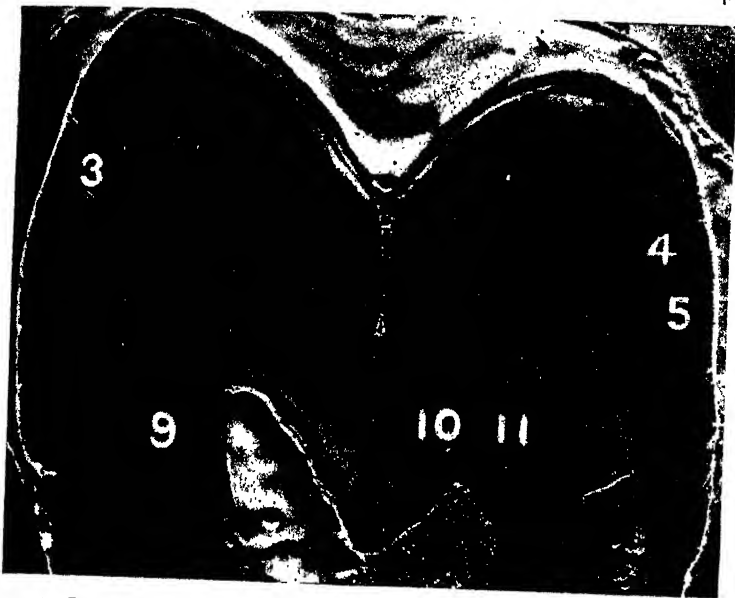

FIGURE 1.—Longitudinal ground section of an upper premolar. Note reference numbers. (× 7)

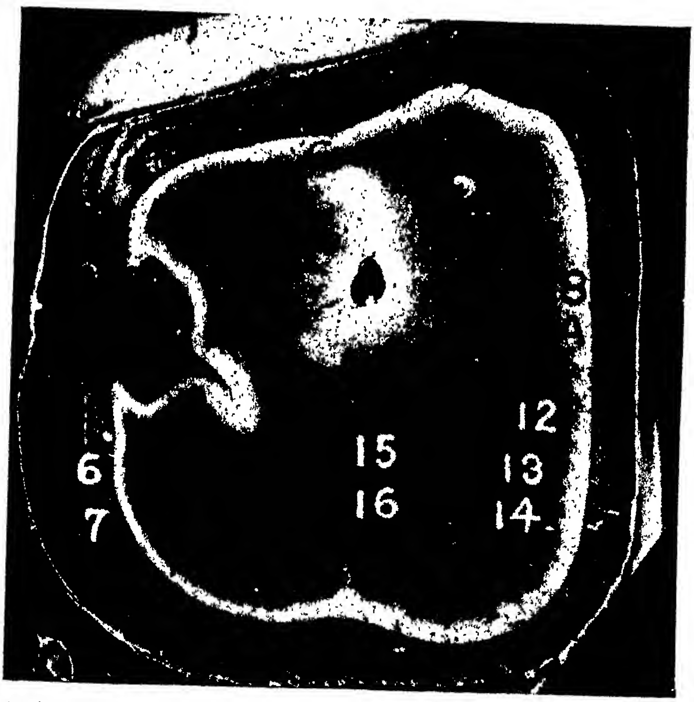

FIGURE 2.—Transverse ground section of an upper molar. Note reference numbers. (× 7)

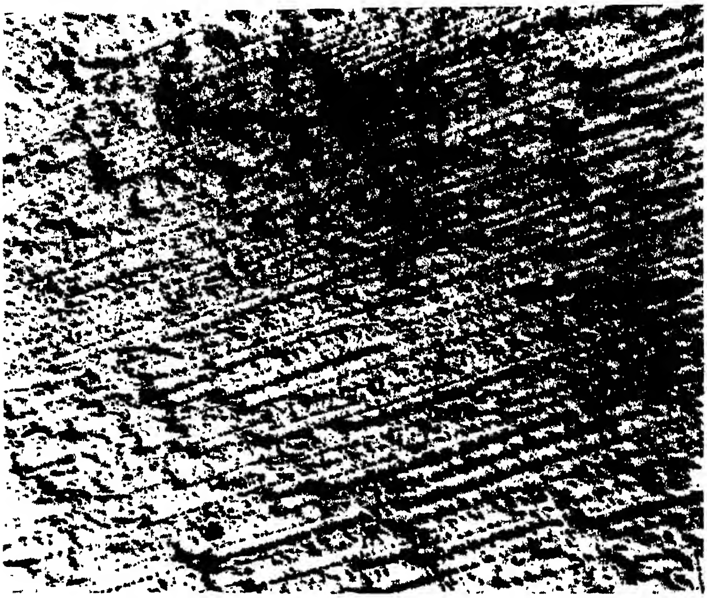

FIGURE 3.—Longitudinal section through enamel. Etched 5 seconds with 0.4 N. HCl. (X 200)

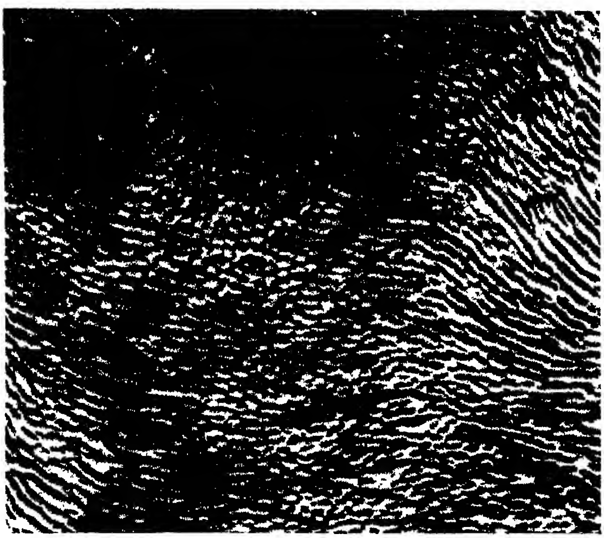

FIGURE 4.—Longitudinal section through enamel. Etched 5 seconds with 0.1 N. HCl. (X 200)

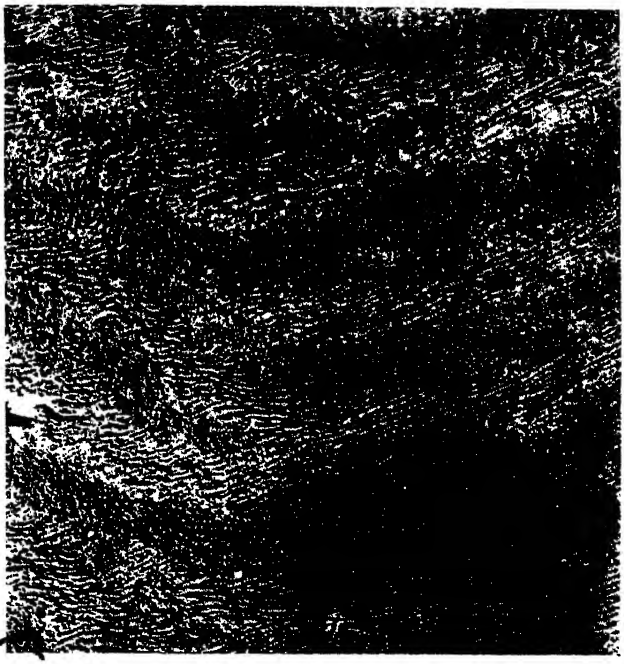

FIGURE 5.—Longitudinal section through enamel. Etched 5 seconds with 0.1 N. HCl. (X 200)

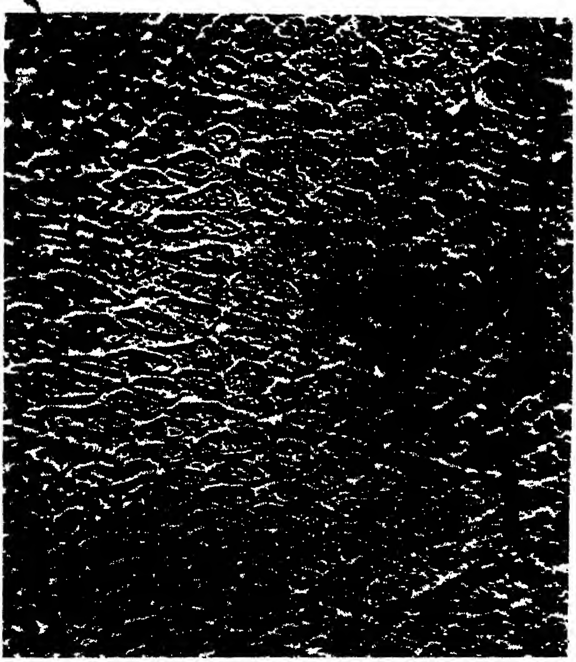

FIGURE 6.—Transverse section through enamel. Etched 5 seconds with 0.1 N. HCl. (X 900)

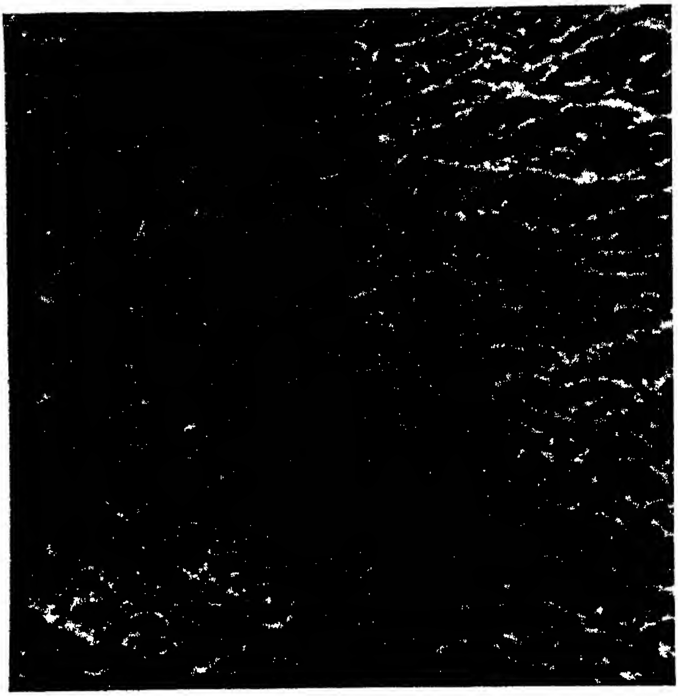

FIGURE 7.—Transverse section through enamel. Etched 5 seconds with 0.1 N.HCl. (× 1500)

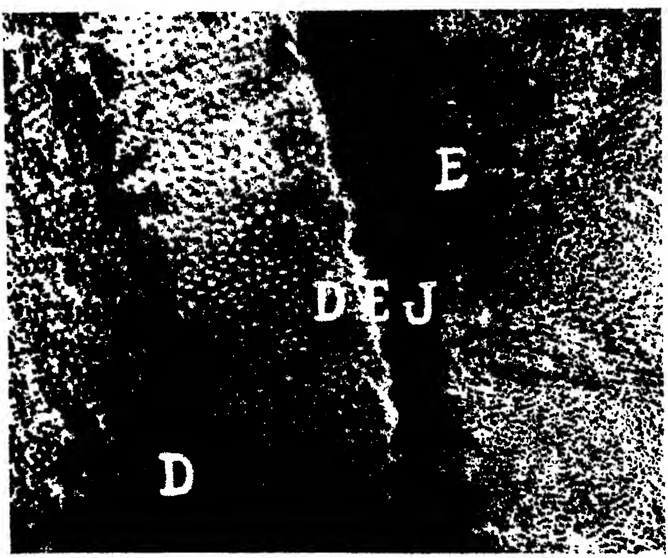

FIGURE 8.—Transverse section through enamel and dentin at dentino-enamel junction. Etched 5 seconds with 3.2 N. HCl. (E=enamel, D=dentin, DEJ=dentino-enamel junction). (× 100)

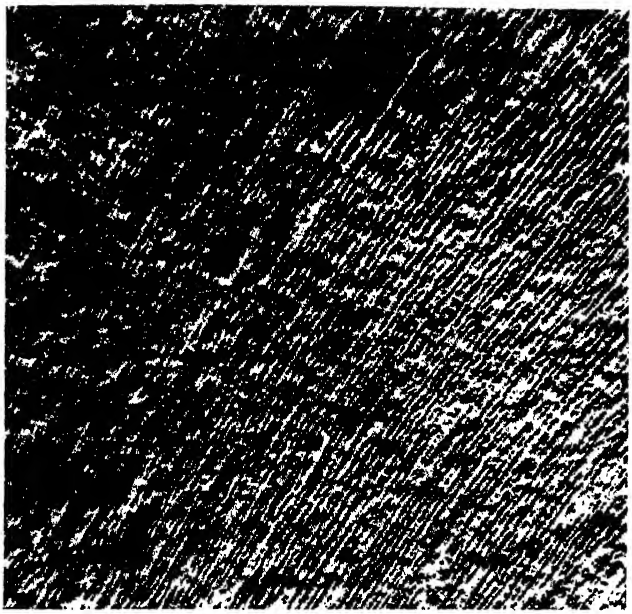

FIGURE 9.—Longitudinal section through dentin. Etched 5 seconds with 3.2 N. HCl. (X 200)

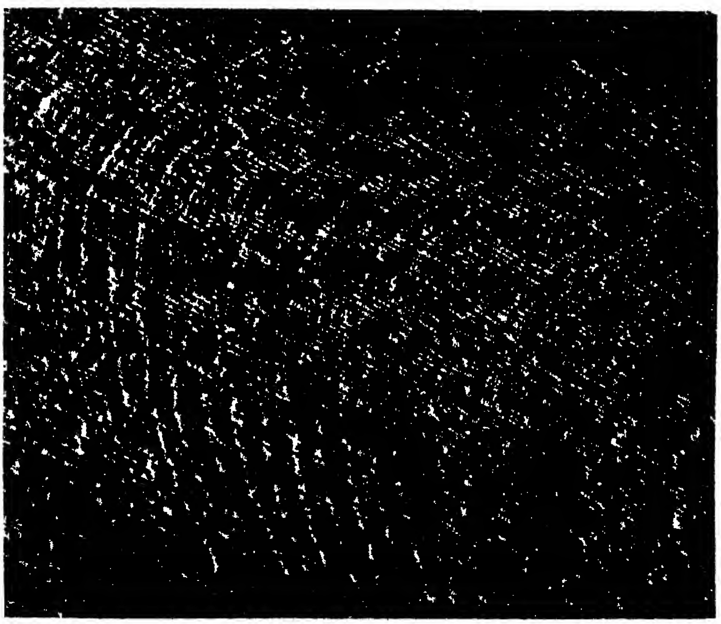

FIGURE 10.—Longitudinal section through dentin. Etched 5 seconds with 3.2 N. HCl. (X 20.)

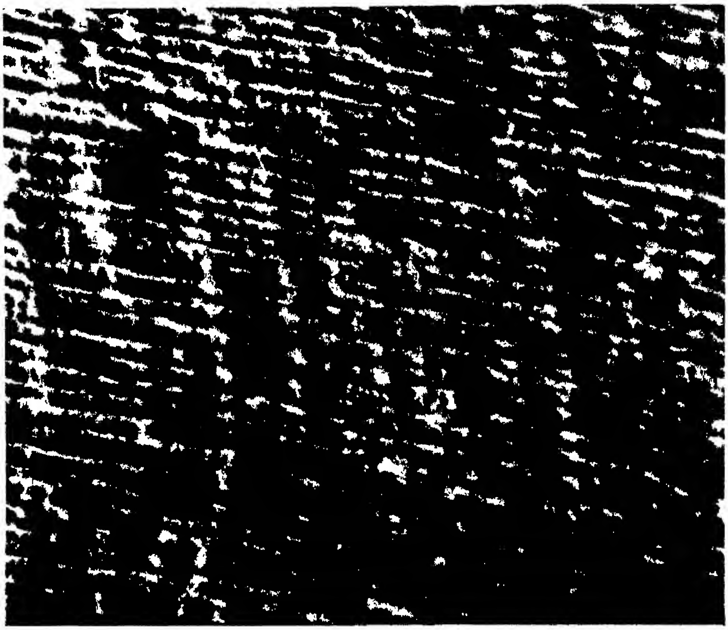

FIGURE 11.—Longitudinal section through dentin. Etched 5 seconds with 3.2 N, HCl. (× 600)

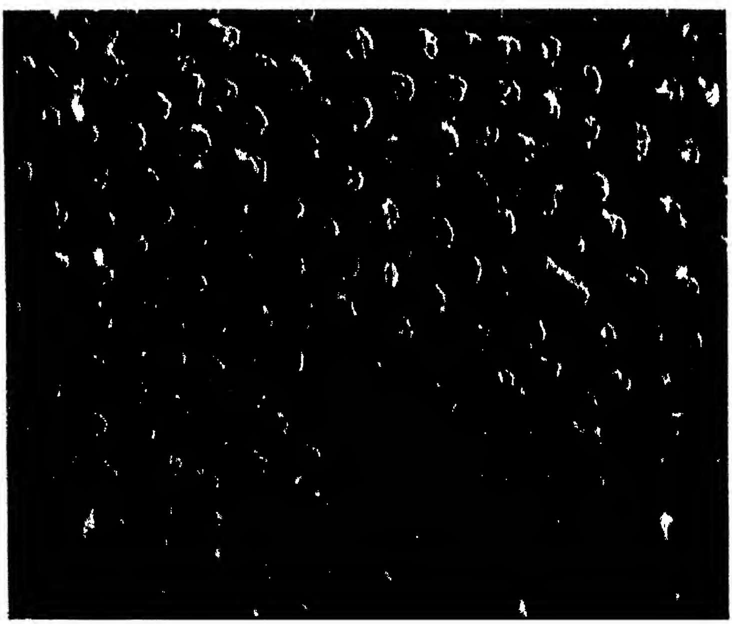

FIGURE 12.—Transverse section through dentin. Etched 5 seconds with 0.4 N. citric acid. (× 1200)

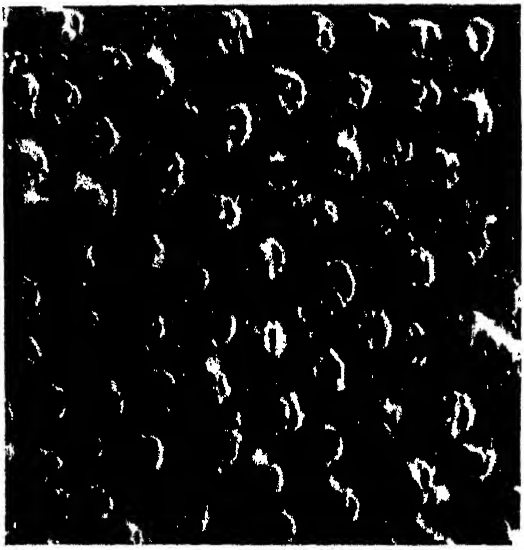

FIGURE 13.—Transverse section through dentin. Etched 5 seconds with 0.4 N. citric acid. (X 1600)

FIGURE 14.—Transverse section through dentin. Etched 5 seconds with 1.6 N. HCl. (X 800)

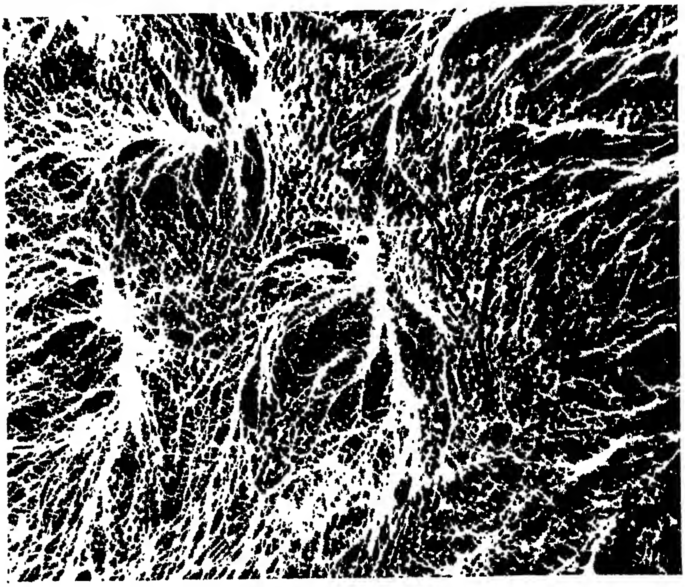

FIGURE 15.—Transverse section through dentin. Etched 5 seconds with 3.2 N. HCl. (X 100)

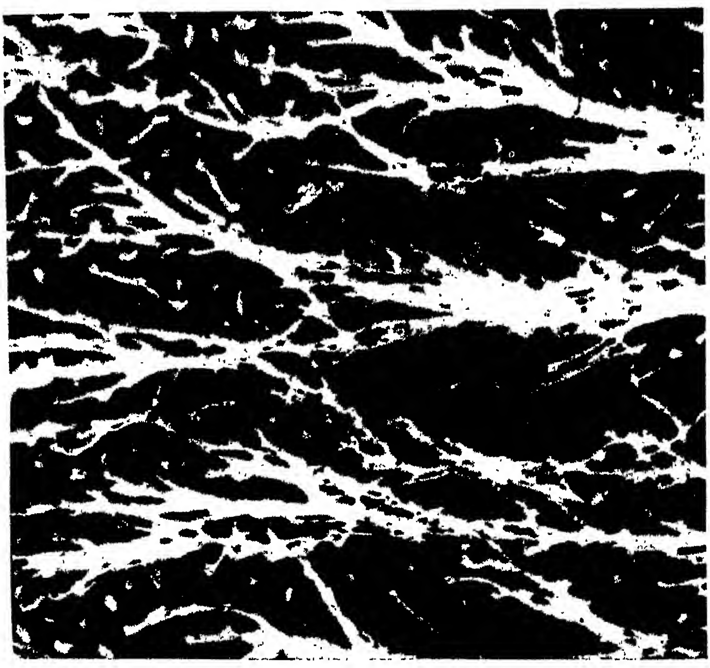

FIGURE 16.—Transverse section through dentin. Etched 5 seconds with 3.2 N. HCl. (X 600)

of agents such as fluorides or silver nitrate on the various histological components of tooth substance. The ability to prepare replicas of the same surface before and after any treatment is of obvious value in such studies. Furthermore, when desired, a part of any section can be reserved as a direct control by covering it with a plastic film [2] or vaseline, which are removed after treatment of the other half and prior to taking the final replica.

SUMMARY

A method is presented for the study of ground sections through teeth by preparation of metal-shadowed collodion replicas of their etched surfaces. The histological detail revealed on these replicas is described. Typical photomicrographs are included to demonstrate the fine structural detail obtained by this procedure.

The applications of this technique to other histological problems is discussed.

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THE EFFECT OF TOPICALLY APPLIED SODIUM FLUORIDE ON DENTAL CARIES EXPERIENCE

IV. REPORT OF FINDINGS WITH TWO, FOUR AND SIX APPLICATIONS[1]

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Reports of studies on the caries-inhibiting effect of fluoride solutions topically applied to the teeth have been made by several investigators. Both the results of such studies and the methods of treatment have varied rather widely. Cheyne (*1*) concluded from his study based

[2] The material used in these studies was Faxfilm, manufactured by the Faxfilm Co., 1220 West Sixth Street, Cleveland 13, Ohio.

[1] From the Dental Section, States Relations Division, U. S. Public Health Service, Washington, D. C., in cooperation with the Minnesota Department of Health, Minneapolis, Minn., the Laboratory of Dental Research, University of Minnesota, Minneapolis, Minn., and the Department of Health, Rochester, Minn.

on two applications of a 0.05 percent potassium fluoride solution that caries incidence in deciduous teeth was reduced 50 percent by the treatments. Bibby (*3*) reported that a 0.1 percent solution of sodium fluoride applied to the teeth every 4 months effected a 30 percent reduction in caries incidence. Knutson and Armstrong (*4*, *5*, *6*) applied a 2 percent sodium fluoride solution 7 to 15 times during a 2-month treatment period and obtained a 40 percent reduction. Arnold et al. (*7*) reported no reduction obtained with one treatment in which 1.0 percent acidulated sodium fluoride was used. Jordan and his associates (*8*) tested the effectiveness of one, two, and three topical applications of 2 percent sodium fluoride solution, and reported 5, 10, and 21 percent reductions, respectively, in caries incidence.

It is evident that variations in results may be due to one or several factors: age of child or more specifically tooth age, type and concentration of the fluoride solution, number of applications in the treatment series, and differences in methods of application. This report presents the results of varying numbers of treatments in which 2 percent sodium fluoride was used throughout as the fluoride solution and in which the applications were not preceded by a dental prophylaxis.

Briefly, the results seem to indicate that omission of prophylaxis prior to initiation of the series of fluoride applications had a noticeable effect. Reduction in caries incidence obtained after two, four, and six topical applications is, on the whole, lower than the reduction obtained in previous studies in which dental prophylaxis was included as part of the treatment procedure. With two fluoride applications, initial caries in fluoride-treated teeth were 9.3 percent less than in untreated teeth. With four and six topical fluoride applications, initial caries in treated teeth was 20.1 and 21.3 percent less, respectively, than in untreated teeth.

MATERIAL AND METHODS

During a 3-month treatment period beginning September 1943, three groups of Rochester, Minn., school children received a series of topical fluoride applications to the teeth in half the mouth. The children in the first of these three groups received two fluoride applications, the second group received four, and the third received six. Half the children in each group were treated in the left side of the mouth and the other half in the right side of the mouth. The teeth in the untreated mouth quadrants served as controls. A dental examination and record of findings was made for each of the 2,016 children participating. The children ranged in age from 7 to 15 years.

The dental examinations were made with mouth mirror and ex-

plorer under artificial light and with compressed air available for use at the examiners' discretion. In each case, only the teeth in the upper and lower quadrants of one side the mouth were fluoride-treated. The treatment consisted of isolating the teeth with cotton rolls, drying with compressed air, and wetting the crown surfaces with a 2 percent solution of sodium fluoride. The applied solution was allowed to dry in air for approximately 4 minutes. The series of fluoride treatments was not preceded by and did not include dental prophylaxis. For each child, a maximum of two treatments was given per week, and the treatments were completed in 3 weeks or less.

Two years after the series of fluoride applications, the teeth of the children in the three treatment groups were reexamined. Both the initial and subsequent dental examinations were made by one of us (J.W.K). Although there were initially 2,016 children included in the study, the 2-year report presented here is based on the 1,458 cases available for reexamination. Most of the children not available had moved away, a few had discontinued schooling, and some were absent at the time of reexamination. Analysis of the data on caries experience is confined to the erupted permanent teeth present in the mouth at the time of the initial examination. The age classification of the children refers to age at the time treatment was given.

FINDINGS

The age distribution of the children included in this analysis, distributed by the number of topical applications of sodium fluoride, is shown in table 1. The proportions of children at each age from

TABLE 1.—*Age distribution of Rochester, Minn., school children examined at the end of the 2-year study period, showing the number of sodium fluoride applications*

Number of applications	All ages	Children by age at time of treatment								
		7	8	9	10	11	12	13	14	15
2	472	12	61	66	64	68	73	62	53	13
4	504	13	61	76	72	64	72	76	61	9
6	482	14	61	63	72	63	68	66	61	13
Total	1,458	39	183	205	208	195	214	204	175	35

7 to 15 included in each of the three treatment groups are approximately equal. Boys and girls are about equally represented, and the children included in each treatment group were selected in about equal proportions from the seven grade schools and two junior high schools in Rochester.

Table 2 presents the caries experience in fluoride-treated and untreated permanent teeth for the 2-year study period by upper and

lower mouth quadrants, and separately for the groups of children who had received two, four, and six topical fluoride applications.

TABLE 2.—*Dental caries experience during the 2-year period ending November 1945 for permanent teeth in the sodium-fluoride-treated and untreated mouth quadrants of the mouths of 1,458 Rochester, Minn., school children*

Treatment groups by treated and untreated quadrants	Number of noncarious teeth (Sept. 1943)	New DF[1] teeth (Nov. 1945)	DF surfaces in new DF teeth	New DF surfaces in previously carious teeth	Total new DF surfaces
	Upper				
2 applications:					
Treated quadrant	1,692	285	370	165	535
Untreated quadrant	1,684	316	416	213	629
4 applications:					
Treated quadrant	1,818	245	304	178	482
Untreated quadrant	1,810	324	380	197	577
6 applications:					
Treated quadrant	1,726	223	266	160	426
Untreated quadrant	1,740	300	343	208	551
	Lower				
2 applications:					
Treated quadrant	1,939	181	245	186	431
Untreated quadrant	1,920	198	259	206	465
4 applications:					
Treated quadrant	2,053	156	191	170	361
Untreated quadrant	2,039	178	234	188	422
6 applications:					
Treated quadrant	1,964	124	146	176	322
Untreated quadrant	1,947	141	174	224	398

[1] DF=carious (decayed or filled).

Table 3 shows the percentage reduction in new caries experience in fluoride-treated teeth, during the 2-year period, compared with untreated teeth.

In the upper jaw quadrants of those children who received two fluoride treatments, 285 fluoride-treated teeth became carious as compared with 316 untreated teeth, a difference of 9.8 percent. In the group that received 4 fluoride treatments, 245 treated teeth became carious as compared with 324 untreated teeth in upper mouth quadrants, a difference of 24.4 percent. In the six-treatment group, there

TABLE 3.—*Percentage reduction in new caries experience during the 2-year period ending November 1945 in the permanent teeth of sodium-fluoride-treated mouth quadrants of a group of Rochester, Minn., school children*

Number of applications	Upper jaw	Lower jaw	Both jaws	Number of applications	Upper jaw	Lower jaw	Both jaws
	Percentage reduction in newly carious teeth				Percentage reduction in newly carious surfaces in previously carious teeth		
[illegible]	9.8	8.6	9.3	2	22.5	9.7	16.2
[illegible]	24.4	12.4	20.1	4	9.6	9.6	9.6
[illegible]	25.7	12.1	21.3	6	23.1	21.4	22.2

were 223 newly carious teeth in upper treated quadrants and 300 in untreated quadrants, a difference of 25.7 percent.

In the lower jaw for the group of children given two fluoride applications, initial caries occurred in 181 treated teeth and in 198 untreated teeth, an 8.6 percent difference. For children who received four fluoride treatments, the number of newly carious teeth in lower quadrants was 156 as compared with 178 in untreated quadrants, a 12.4 percent difference. In the lower jaws of the six-treatment group, 124 treated teeth and 141 untreated teeth became carious, a 12.1 percent difference.

Combining initial caries experience for teeth in upper and lower mouth quadrants, there is an over-all difference between treated and untreated teeth of 9.3 percent associated with two fluoride applications, 20.1 percent with four applications, and 21.3 percent with six applications.

Data on the occurrence of newly carious surfaces in previously carious teeth are also presented in tables 2 and 3. The number of additional tooth surfaces which became carious, during the 2-year study period, in teeth which were decayed at the time of treatment was less for fluoride-treated than for untreated carious teeth. The percentage differences were 16.2 for carious teeth given two fluoride applications, 9.6 percent for four applications, and 22.2 percent for six applications. The irregularity in the pattern of these differences is difficult to explain, since it would be expected that four treatments would effect a greater difference than two.

Comparison of the results of this study and that conducted by Jordan and his associates (*8*) is of special interest. In both investigations, 2 percent sodium fluoride solution was topically applied, and the same treatment procedure was used, with the exception that one was preceded by dental prophylaxis and the other was not. In Jordan's study, the reduction in caries incidence associated with one, two and three fluoride applications was 5, 10, and 21 percent, respectively. In the present study, two, four, and six applications effected a 9.3, 20.1, and 21.3 percent reduction, respectively. Thus, four and six applications of 2 percent sodium fluoride solution to the teeth, without prior prophylaxis, were only as effective in inhibiting dental caries as three treatments preceded by a dental prophylaxis. In an earlier study (*4, 5, 6*), teeth treated, after prophylaxis, with 7 to 15 applications of 2 percent sodium fluoride solution had approximately 40 percent less caries than untreated teeth. Analysis of the composite findings of the three studies suggests, therefore, that four fluoride treatments preceded by dental prophylaxis are likely to give the maximum reduction in caries incidence obtainable with 2 percent sodium fluoride solution, using the treatment procedure herein de-

scribed. Confirmation of this conclusion, however, must await the results of studies now in progress.

SUMMARY

Data on the incidence of dental caries in the permanent teeth of three groups of Rochester, Minn., school children who received two, four, and six applications, respectively, of 2 percent sodium fluoride solution to the teeth in half the mouth have been presented and analyzed. The initial dental examinations and the fluoride treatment series were completed during a 3-month period beginning September 1943, and the follow-up examinations were made approximately 2 years later in November 1935. The teeth in the untreated half of the mouth served as controls. The treatment procedure used in this study did not include a dental prophylaxis. Analysis of the data indicates that for the 2-year period following the fluoride treatments:

1. The incidence of initial caries in permanent teeth which were noncarious at the time of treatment was 9.3, 20.1, and 21.3 percent less in teeth treated with two, four, and six applications of fluoride solution, respectively, than in untreated teeth.

2. The numbers of additional permanent tooth surfaces which became carious in teeth which were carious at the time of treatment were 16.2, 9.6, and 22.2 percent less in fluoride-treated carious teeth given two, four, and six applications, respectively, than in untreated carious teeth.

3. Comparison of the results of this investigation with those previously reported (*4, 5, 6, 8*) indicates that omission of a dental prophylaxis from the treatment procedure materially reduces the caries-inhibiting effects of the topical fluorides.

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(*5*) ———. *Ibid.* II. Report of findings for the second study year. Pub. Health Rep., **60**: 1085–1090 (Sept. 14, 1945).

(*6*) ———. *Ibid.* III. Report of findings for the third study year. Pub. Health Rep., **61**: 1683–1689 (Nov. 22, 1946).

(*7*) Arnold, Francis A., Jr.; Dean, H. Trendley; and Singleton, Dennis E., Jr.: The effect of caries incidence of a single topical application of a fluoride solution to the teeth of young adult males of a military population. J. Dent. Research, **23**: 155–162 (June 1944).

(*8*) Jordan, W. A.; Wood, O. B.; Allison, J. A.; and Irwin, V. D.: The effects of various numbers of topical applications of sodium fluoride. J. Am. Dent. Assoc., **33**: 1385–1391 (Nov. 1, 1946).

PLAGUE INFECTION REPORTED IN THE UNITED STATES IN 1945[1]

No human case of plague was reported in the United States during 1945. The last reported human infection was a case of primary pneumonic plague which occurred in June 1944 in a medical officer of the Public Health Service who was engaged in research at the Plague Laboratory in San Francisco. The patient recovered.[2] The last reported human case acquired in nature occurred in Siskiyou County, California, in August 1943.[3]

PLAGUE INFECTION IN RODENTS AND ECTOPARASITES

During 1945 plague infection in rodents or their ectoparasites was reported in 8 counties in California, 1 county in Idaho, 1 county in Wyoming, and 2 counties in Kansas. Infection was found in specimens of tissue or ectoparasites of the following listed species: Ground squirrels (*Citellus beecheyi*, *Citellus beldingi*, *Callospermophilus lateralis*, and *Otospermophilus fisheri*), mice (*Peromyscus* sp., *Microtus* sp., and *Reithrodontomys* sp.), and rats (*Neotoma* sp.).

The proved area of infection in wild rodents of the western States was extended farther east by the finding of positive specimens of fleas from mice (*Peromyscus* sp., *Microtus* sp., and *Reithrodontomys* sp.) and from rats (*Neotoma* sp.) taken in Cheyenne and Morton Counties, Kansas, in June, July, and August. These are the first instances reported of plague infection being found in this State, and the localities are the farthest east that the infection had been reported in wild rodents or their ectoparasites in the United States up to the end of 1945. They are slightly farther east than Cimarron County, Oklahoma, where infected fleas from wood rats (*Neotoma* sp.) and white-footed mice (*Peromyscus* sp.) were found in June 1944.

The reports summarized in the accompanying table should not be interpreted as a delineation of areas in which plague infection was present in wild rodents of the Western States in 1945, nor as a quantitative measure of infection. The field surveys are limited by the number of personnel, the areas in which the surveys are conducted, and the seasonal periods favorable for field operations. At best, these field surveys are essentially sampling procedures. However, over a period of years they have demonstrated a wide biologic and

[1] Consolidation of reports received from the Plague Laboratory of the United States Public Health Service in San Francisco, Calif., and the California State Department of Health, and published currently in the PUBLIC HEALTH REPORTS. For a similar report for 1944 and a summary of human cases reported in the United States for 1900 to 1944, inclusive, see Pub. Health Rep. 60: 1361–1365 (Nov. 16, 1945).

[2] Pub. Health Rep. 60: 1361; J. Am. Med. Assoc., 128: 281–283 (May 26, 1945).

[3] Pub. Health Rep. 59: 911 (July 14, 1944).

geographic distribution of plague infection in western United States and a gradual extension eastward of the area of proved infection.

In the reports presented in the table, plague infection in animal tissue and ectoparasites was proved in each instance bacteriologically and by the inoculation of laboratory animals, especially by mass inoculation with emulsions of parasites.

TABLE 1.—*Plague infection in wild rodents and their ectoparasites reported to the United States Public Health Service during 1945*

State and county	Date [1]	Infection found in—
California:		
Alpine County	Aug. 16	Tissue from 1 ground squirrel, *Citellus beldingi*, taken in Hope Valley, 6 miles west of Woodfords on Kit Carson Pass Highway No. 88.
Do	Aug. 21	Tissue from 2 ground squirrels, *Citellus beldingi*, taken at same location.
Do	Sept. 6	Tissue from 1 ground squirrel, *Citellus beldingi*, shot at Kit Carson Public Camp, 4 miles west of Woodfords on Highway No. 89; and a pool of 24 fleas from 2 golden-mantled ground squirrels, *Callospermophilus* sp., taken in Mono National Forest, Crystal Springs Public Camp grounds, 1 mile west of Woodfords.
Kern County	July 31, Aug. 7	A pool of 200 fleas and 87 lice and an additional pool of 200 fleas from 35 ground squirrels, *Citellus beecheyi*, shot on east side of Castair Lake, 1½ miles east and ½ mile north of Lebec.
Do	Aug. 7	A pool of 185 fleas from 4 ground squirrels, *Citellus beecheyi*, taken 1½ miles east and ½ mile south of Lebec.
Do	Aug. 21, 27, 30	3 pools of 200 fleas each from 34 ground squirrels, *Citellus beecheyi*, shot on El Tejon ranch, on east side of Castair Lake (proved positive on Aug. 21, 27, and 30, respectively).
Do	Aug. 27	A pool of 215 fleas from 14 ground squirrels, *Citellus beecheyi*, shot 1 mile south of Lebec.
Do	do	Tissue from 1 ground squirrel, *Citellus beecheyi*, shot 2 miles east and 2-4 miles north of Lebec.
Do	Aug. 30	A pool of 50 lice from 42 ground squirrels, *Citellus beecheyi*, taken 2 miles east and 2-4 miles north of Lebec, and a pool of 200 fleas from 34 ground squirrels, *Citellus beecheyi*, taken 2½ miles west and 1 mile south of Cummings Valley School.
Do	Sept. 6	A pool of 200 fleas from 53 ground squirrels, *Citellus beecheyi*, taken 2½ miles south and 3 miles west of Cummings Valley School.
Do	Sept. 12	A pool of 200 fleas from 13 ground squirrels, *Citellus beecheyi* taken 2 miles south and 1½ miles west of same school.
Merced County	Sept. 28	A pool of 200 fleas from 54 ground squirrels, *Citellus beecheyi*, shot 12 miles west and 1 mile north of Los Banos.
Placer County	Sept. 20	A pool of 54 fleas from 9 ground squirrels, *C. beecheyi*, taken in Tahoe National Forest, 1½ miles north of Tahoe City.
San Benito County	May 14	Tissue from 1 ground squirrel, *C. beecheyi*, taken 7 miles east and 3 miles south of Tres Pinos.
Do	June 22	A pool of 192 fleas from 57 ground squirrels, same species, taken in same location; a pool of 400 fleas from 62 ground squirrels, same species taken 13 miles southeast of Tres Pinos; a pool of 400 fleas and 9 ticks from 37 ground squirrels, same species, taken in Brown's Valley, 7 miles east and 5 miles south of Tres Pinos; and a pool of 200 fleas from 23 ground squirrels, same species, taken in Brown's Valley, 8 miles east and 5 miles south of Tres Pinos.

[1] Date proved positive in laboratory.

TABLE 1.—*Plague infection in wild rodents and their ectoparasites reported to the United States Public Health Service during 1945*—Continued

State and county	Date [1]	Infection found in—
San Benito County—Con.	June 27	A pool of 203 fleas from 17 ground squirrels, *C. beecheyi*, taken 7 miles east of Tres Pinos; tissue from 5 ground squirrels, same species, taken 8 miles east and 5 miles south of Tres Pinos; a pool of 400 additional fleas from the same 57 ground squirrels which were proved positive on June 22; 379 additional fleas from the same 37 ground squirrels (Brown's Valley) which were proved positive on June 22; and 185 additional fleas from the same 23 ground squirrels taken in Brown's Valley and proved positive on June 22.
Do	July 5	An additional pool of 200 fleas from the same 57 ground squirrels taken in Brown's Valley and proved positive on June 22; and a pool of 204 fleas from 59 ground squirrels, *C. beecheyi*, taken 5 miles east of Tres Pinos.
Do	July 13	A pool of 750 fleas from 27 ground squirrels, and tissue from 5 ground squirrels, *C. beecheyi*, taken in Brown's Valley, 7 miles east and 5 miles south of Tres Pinos; a pool of 1,650 fleas from 41 ground squirrels and tissue from 5 ground squirrels, *C. beecheyi*, taken in Brown's Valley, 8 miles east and 5 miles south of Tres Pinos; and a pool of 150 fleas from 47 ground squirrels, *C. beecheyi*, taken 7 miles east of Tres Pinos.
Do	July 17	A pool of 150 fleas from 35 ground squirrels and tissue from 5 ground squirrels, *C. beecheyi*, taken 1 miles east of Tres Pinos.
Do	July 25	A pool of 150 fleas from 41 ground squirrels, *C. beecheyi*, taken 8 miles east and 5 miles south of Tres Pinos.
San Bernardino County	June 27	A pool of 11 fleas from 15 mice, *Peromyscus* sp., taken 1 mile north of Fawnskin, and a pool of 52 fleas from 3 ground squirrels, *Otospermophilus fisheri*, taken 1 mile west and 1 mile north of Big Bear Lake.
San Luis Obispo County	Dec. 13	A pool of 200 fleas from 26 ground squirrels, *C. beecheyi*, taken on Santa Margarita Rancho, Pozo Road, Santa Margarita.
Santa Clara County	July 16 [1]	A pool of 150 fleas from 35 ground squirrels, *C. beecheyi*, taken 5 miles east and 1½ miles north of Gilroy.
Do	Sept. 12	A pool of 400 fleas from 80 ground squirrels, *C. beecheyi*, taken 16 miles southeast of Gilroy, and a pool of 200 fleas from 13 ground squirrels and tissue from 1 ground squirrel, *C. beecheyi*, taken 6½ miles east and 2 miles south of Gilroy.
Do	Sept. 13	Tissue from 2 ground squirrels, *C. beecheyi*, taken 16 miles southeast of Gilroy.
Idaho:		
Bannock County	June 14	A pool of 16 fleas from 28 mice, *Peromyscus* sp., taken 1 mile east of State Highway No. 34, 4 miles south of Grace. (Collected June 1.)
Do	June 18	A pool of 205 fleas, 7 ticks, and 8 lice from 3 marmots taken at the same location.
Kansas:		
Cheyenne County	June 23	A pool of 105 fleas from mice, *Peromyscus*, sp., *Microtus*, sp., and *Reithrodontomys*, sp., taken 5 miles south of Benkleman, Nebr., on Highway No. 61 and 5 miles east on unmarked road.[3]
Cheyenne County	July 17	A pool of 17 fleas from 21 mice, *Microtus* sp., and a pool of 73 fleas from 116 mice, *Peromyscus* sp., taken from same location.
Morton County	Aug. 17	A pool of 43 fleas from 83 mice, *Peromyscus* sp., and 52 fleas from 6 rats, *Neotoma* sp., taken 10 miles north of Elkhart, State Highway No. 27, and 5 miles west along river bottom.[4]
Wyoming:		
Laramie County	Aug. 14	A pool of 33 fleas from 108 ground squirrels, *Callospermophilus lateralis*, taken 34 miles west of Cheyenne, on U. S. Highway No. 30, in Medicine Bow National Forest.

[1] Date received at laboratory.

[3] This is the first reported incidence of plague infection found in Kansas, and this locality is the farthest east in which infection had been found in wild rodents or their ectoparasites in the United States up to Dec. 31, 1945.

[4] This location is approximately the same longitude as that of the locality in Cheyenne County.

INCIDENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES

January 26–February 22, 1947

The accompanying table summarizes the incidence of nine important communicable diseases, based on weekly telegraphic reports from State health departments. The reports from each State for each week are published in PUBLIC HEALTH REPORTS under the section "Incidence of Disease." The table gives the number of cases of these diseases for the 4 weeks ended February 22, 1947, the number reported for the corresponding period in 1946, and the median number for the years 1942–46.

DISEASES ABOVE MEDIAN INCIDENCE

Diphtheria.—For the 4 weeks ended February 22 there were 1,165 cases of diphtheria reported, as compared with 1,487 cases during the corresponding 4 weeks in 1946 and a 1942–46 median of 1,158 cases. For the first time since the 4 weeks ended August 10, 1946, the current incidence is higher than the preceding 5-year median for a corresponding 4-week period. The North Atlantic and East North Central sections are now reporting a relatively high number of cases of this disease, while in the southern sections of the country, where the incidence has been unusually high, the cases either closely approximated the median or fell considerably below it. In the West North Central, Mountain, and Pacific sections the incidence is about normal.

Poliomyelitis.—The number of cases of poliomyelitis dropped from 315 during the preceding 4 weeks to 184 for the current 4-week period. The number of cases was, however, 30 percent above the 1946 figure for the corresponding period and 80 percent above the 1942–46 median (101 cases). The South Atlantic, East South Central, West South Central, and Mountain sections reported fewer cases than in 1946, but only two sections, the East South Central and Mountain, reported a decline from the 1942–46 median. The number of cases reported for the entire country was 40 percent greater during the first 8 weeks of the current year than for the same weeks in 1946.

Whooping cough.—The number of cases (10,259) of this disease was 1.5 times the number reported for the corresponding 4 weeks in 1946 and was slightly higher than the 1942–46 median. The greatest increases over the normal seasonal expectancy were reported from the East North Central and West South Central sections, with slighter increases in the North Atlantic sections. In the other five sections, the incidence was relatively low.

DISEASES BELOW MEDIAN INCIDENCE

Influenza.—For the country as a whole, the incidence of influenza declined during the 4 weeks ended February 22. Of the total of 15,707 cases reported, as compared with 16,910 during the preceding 4 weeks, 12,725, or more than 80 percent of the total, occurred in four States (Texas 7,768 cases, Virginia 1,825, South Carolina 1,693, and Colorado 1,449). The highest previous incidence had been confined largely to the first three States mentioned, but the number of cases in Colorado rose from 140 and 144, respectively, for the two preceding weeks to 1,117 during the week ended February 22. Compared with preceding years, the incidence was lower than in 1946 in each geographic section and lower than the 1942–46 median in all sections except the Mountain, which includes Colorado. The current incidence was the lowest recorded since 1938, when approximately 13,000 cases were reported for the corresponding 4 weeks.

Measles.—The number of reported cases (20,417) of measles was less than one-half of the number reported during the corresponding weeks in 1946 and about one-third of the 1942–46 median (approximately 60,000 cases). The incidence was relatively high in the New England and South Atlantic sections, but in all other sections of the country the numbers of cases were below the median expectancy. Since the median period (1942–46) contains 3 years in which this disease was unusually prevalent, the medians are represented in most sections by rather high numbers. The median for more normal recent years is approximately 25,000 cases.

Meningococcus meningitis.—During the 4 weeks ended February 22 there were 322 cases of meningococcus meningitis reported. The number was less than 50 percent of that reported for the corresponding period in 1946, and less than 35 percent of the 1942–46 median. In each section of the country the current incidence was below that in 1946 and also below the preceding 5-year median. For the country as a whole, the current incidence was the lowest since 1942 when 273 cases were reported for the corresponding 4 weeks.

Scarlet fever.—The incidence of scarlet fever was the lowest reported during this period in the 19 years for which data are available in this form. For the 4 weeks ended February 22 there were 11,017 cases reported, as compared with 13,443 for the corresponding 4 weeks in 1946 and a 1942–46 median of 16,265 cases. In each section of the country the current incidence was lower than the preceding 5-year median expectancy.

Smallpox.—The 13 cases of smallpox reported for the current 4-week period was less than one-half of the cases reported for the corresponding period in 1946 and less than one-fourth of the 1942–46

median. Five cases in the East North Central section compared with a seasonal expectancy of 16 cases, and 4 cases in the East South Central section was the same as the median expectancy. For the entire country, the current incidence is the lowest in the 19 years for which these data are available; the nearest approach to the current figure was in 1942 and 1943 when 15 and 17 cases, respectively, were reported for the corresponding 4 weeks.

Typhoid and paratyphoid fever.—The number of cases (167) of these diseases was slightly higher than that reported for the corresponding period in 1946, but it was only about 65 percent of the preceding 5-year median (258 cases). In the Mountain and Pacific sections, the incidence was somewhat above the median expectancy, but in all other sections the numbers of cases were relatively low. The cur-

Number of reported cases of nine communicable diseases in the United States during the 4-week period January 26–February 22, 1947, the number for the corresponding period in 1946, and the median number of cases reported for the corresponding period, 1942–46

Division	Current period	1946	5-year median	Current period	1946	5-year median	Current period	1946	5-year median
	Diphtheria			Influenza [1]			Measles [2]		
United States	1,165	1,487	1,158	15,707	38,746	22,139	20,417	48,914	60,335
New England	75	30	25	65	146	127	6,036	1,314	4,084
Middle Atlantic	166	169	116	63	133	133	3,444	13,341	13,341
East North Central	176	307	160	169	1,011	495	3,471	12,128	7,455
West North Central	97	158	97	228	277	235	438	4,753	4,753
South Atlantic	160	228	185	3,893	10,003	6,738	3,376	3,298	3,298
East South Central	114	122	106	503	3,016	2,825	301	2,494	2,494
West South Central	169	223	247	8,484	19,712	9,817	786	2,669	2,785
Mountain	59	74	65	2,147	2,637	1,999	1,661	1,934	3,215
Pacific	149	176	156	155	1,811	634	904	6,983	6,983
	Meningococcus meningitis			Poliomyelitis			Scarlet fever		
United States	322	733	1,034	184	143	101	11,017	13,443	16,265
New England	13	41	41	7	3	3	1,038	1,156	2,036
Middle Atlantic	83	153	213	19	15	15	2,835	3,498	3,945
East North Central	42	118	151	30	11	9	3,391	3,757	4,801
West North Central	27	70	70	19	7	7	1,027	1,393	1,880
South Atlantic	44	103	161	26	32	14	742	1,122	1,293
East South Central	23	84	107	13	16	14	447	430	687
West South Central	43	72	94	16	17	13	236	506	506
Mountain	7	11	22	4	7	7	440	481	1,008
Pacific	40	81	107	50	35	27	861	1,100	1,100
	Smallpox			Typhoid and paratyphoid fever			Whooping cough [2]		
United States	13	29	64	167	150	258	10,259	6,998	9,357
New England	0	0	0	10	12	12	1,147	910	1,141
Middle Atlantic	0	1	0	23	12	36	2,072	1,925	1,925
East North Central	5	3	16	23	22	28	2,597	1,481	1,625
West North Central	2	3	5	8	7	11	372	182	515
South Atlantic	0	1	2	31	38	43	1,219	850	1,469
East South Central	4	2	4	15	9	22	381	226	397
West South Central	1	15	16	29	25	38	1,545	579	658
Mountain	0	3	3	11	6	8	318	361	469
Pacific	1	1	1	17	19	16	608	484	1,073

[1] Mississippi and New York excluded; New York City included.
[2] Mississippi excluded.

rent incidence represents a 10-percent increase over the 150 cases that were reported for this period in 1946, which was the lowest incidence during these weeks in the 19 years for which data are available in this form.

MORTALITY, ALL CAUSES

For the 4 weeks ended February 22 there were 39,014 deaths from all causes reported to the National Office of Vital Statistics by 93 large cities. The median number of deaths reported for the same weeks in 1944–46 was 39,409. For the first 2 weeks of the 4-week period, the figures were below the preceding 3-year medians, but during the last 2 weeks the current figures were higher than the median; for the entire 4-week period the current total was slightly lower than the 3-year median.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED MARCH 1, 1947

Summary

Of the total of 7,974 cases of influenza (as compared with 5,192 last week), the 8 States reporting currently more than 130 cases reported an aggregate of 7,259 cases, or 91 percent (last week 4,575, or 88 percent). These States are as follows (last week's figures in parentheses): Kansas 325 (61); Virginia 491 (534), South Carolina 628 (225), Georgia 454 (39), Arkansas 376 (126), Texas 3,636 (2,465), Colorado 1,212 (1,117), and Indiana 137 (8). Only 2 other States reported more than 71 cases each—Alabama (130) and Missouri (90). The total to date is 40,591, as compared with 160,350 for the corresponding period last year and a 5-year (1942–46) median of 44,521.

Of 51 cases of poliomyelitis reported currently (last week 37, 5-year median 23), California reported 15 (last week 9), Mississippi 5, Wisconsin 4, and Illinois and Florida 3 each. The cumulative total is 551, as compared with 406 for the corresponding period last year and a 5-year median of 247.

Of 173 cases of undulant fever reported during the current week (last week 114), 57 occurred in Iowa, 26 in Missouri, and 15 each in Illinois and Texas. The cumulative total is 921, as compared with 573 and 760, respectively, for the corresponding periods of 1946 and 1945.

The current incidence of diphtheria, typhoid and paratyphoid fever, and whooping cough is slightly above the corresponding 5-year medians. The cumulative figure for whooping cough, 22,393, as compared with 20,816 for the 5-year median, is above figures for the corresponding periods of the past 3 years, but less than two-thirds of the figures for the same periods of the years 1942–44.

The combined total to date for dysentery (amebic, bacillary, and undefined) is 5,473, as compared with 4,004 for the corresponding period last year, and the cumulative total for tularemia is 390, as compared with 189 for the corresponding period last year.

Deaths recorded for the week in 93 large cities of the United States totaled 10,165, as compared with 9,741 last week, 10,390 and 9,866, respectively, for the corresponding weeks of 1946 and 1945, and a 3-year (1944–46) median of 9,866. The cumulative figure is 89,943, as compared with 94,394 for the corresponding period last year.

Telegraphic morbidity reports from State health officers for the week ended March 1, 1947, and comparison with corresponding week of 1946 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46
	Mar. 1, 1947	Mar. 2, 1946		Mar. 1, 1947	Mar. 2, 1946		Mar. 1, 1947	Mar. 2, 1946		Mar. 1, 1947	Mar. 2, 1946	
NEW ENGLAND												
Maine	1	1	1	3	30	1	201	10	10	1	4	4
New Hampshire	0	0	0	------	------	------	19	------	------	0	1	1
Vermont	0	4	0	------	10	------	150	2	20	0	0	0
Massachusetts	14	6	6	------	------	------	450	446	593	1	2	11
Rhode Island	0	1	1	------	2	1	150	6	27	0	0	4
Connecticut	0	1	1	1	4	3	457	107	259	0	3	4
MIDDLE ATLANTIC												
New York	13	19	19	[1] 7	[1] 8	[1] 10	257	4,228	2,040	10	18	34
New Jersey	17	3	3	15	15	11	222	1,259	1,259	2	2	13
Pennsylvania	10	13	11	4	5	3	480	2,869	976	10	24	24
EAST NORTH CENTRAL												
Ohio	8	32	8	3	11	11	509	156	261	4	12	11
Indiana	17	18	9	137	5	35	43	529	320	0	2	4
Illinois	8	14	14	6	8	16	64	1,888	835	5	23	20
Michigan [2]	7	7	4	1	2	2	68	2,867	241	3	8	8
Wisconsin	0	0	0	11	310	59	255	729	729	3	2	4
WEST NORTH CENTRAL												
Minnesota	8	8	5	------	2	1	53	25	58	3	6	3
Iowa	5	4	3	------	------	1	94	45	298	1	3	1
Missouri	1	8	4	90	7	6	8	560	387	2	4	7
North Dakota	0	3	0	12	11	11	6	2	53	0	2	1
South Dakota	3	1	1	------	------	------	8	83	68	1	0	0
Nebraska	0	1	3	15	19	19	20	114	114	0	0	0
Kansas	7	7	7	325	1	8	10	875	428	0	2	2
SOUTH ATLANTIC												
Delaware	0	3	0	------	------	------	2	22	20	0	2	1
Maryland [2]	6	9	9	2	4	18	20	232	232	1	6	6
District of Columbia	0	0	0	2	1	2	9	124	113	1	0	2
Virginia	5	5	6	491	430	616	547	591	338	1	6	10
West Virginia	2	5	4	52	12	38	80	42	42	0	2	2
North Carolina	11	10	11	------	------	19	257	323	323	0	6	8
South Carolina	2	5	3	628	711	711	75	264	192	0	1	4
Georgia	4	0	5	454	30	115	229	224	224	0	2	4
Florida	4	2	2	1	4	4	6	53	53	2	7	7
EAST SOUTH CENTRAL												
Kentucky	7	20	5	14	173	35	286	648	205	8	3	8
Tennessee	7	4	4	33	47	47	164	242	242	3	6	7
Alabama	9	6	6	130	308	232	69	135	135	3	4	4
Mississippi [2]	10	12	6	------	------	------	------	------	------	1	5	5
WEST SOUTH CENTRAL												
Arkansas	5	18	5	376	223	174	130	70	90	1	3	3
Louisiana	10	1	2	54	140	8	27	23	85	6	1	3
Oklahoma	10	10	6	62	198	198	4	155	107	0	2	1
Texas	22	49	37	3,636	1,792	1,634	286	574	574	9	5	6
MOUNTAIN												
Montana	1	7	1	20	12	24	188	11	90	0	0	0
Idaho	1	2	0	10	54	------	5	86	86	0	1	0
Wyoming	4	0	0	31	------	9	7	12	73	1	1	1
Colorado	8	3	6	1,212	91	67	81	275	275	0	1	1
New Mexico	1	0	2	6	9	8	24	9	12	0	0	0
Arizona	1	2	1	71	213	184	40	48	48	2	0	1
Utah [2]	1	0	0	13	60	60	7	512	124	0	0	0
Nevada	0	0	0	------	------	3	------	13	7	0	0	0
PACIFIC												
Washington	1	11	5	13	------	2	37	687	151	2	3	3
Oregon	7	9	2	8	14	25	54	229	142	0	1	1
California	23	18	20	25	361	87	230	2,386	1,712	8	16	18
Total	281	362	270	7,974	5,337	5,249	6,388	24,790	18,496	95	202	267
9 weeks	2,724	3,573	2,880	40,591	160,350	44,521	41,825	93,989	114,719	762	1,845	2,254
Seasonal low week [3]	(27th) July 5-11			(30th) July 26-Aug. 1			(35th) Aug. 30-Sept. 5			(37th) Sept. 13-19		
Total since low	10,290	15,217	11,822	73,566	522,598	80,383	64,712	120,113	152,945	1,734	3,349	4,705

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Dates between which the approximate low week ends. The specific date will vary from year to year.

Telegraphic morbidity reports from State health officers for the week ended March 1, 1947, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever[4]		
	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46
	Mar. 1, 1947	Mar. 2, 1946		Mar. 1, 1947	Mar. 2, 1946		Mar. 1, 1947	Mar. 2, 1946		Mar. 1, 1947	Mar. 2, 1946	
NEW ENGLAND												
Maine	0	0	0	21	65	37	0	0	0	1	1	0
New Hampshire	0	0	0	3	35	11	0	0	0	0	0	0
Vermont	0	0	0	4	2	8	0	0	0	0	0	0
Massachusetts	0	1	0	136	198	322	0	0	0	1	5	1
Rhode Island	0	0	0	12	13	17	0	0	0	0	0	0
Connecticut	1	0	0	38	53	61	0	0	0	0	1	1
MIDDLE ATLANTIC												
New York	1	2	1	422	596	569	0	0	0	1	5	5
New Jersey	0	1	1	132	144	175	0	0	0	1	1	1
Pennsylvania	2	0	0	259	407	563	0	0	0	3	1	5
EAST NORTH CENTRAL												
Ohio	2	1	1	453	350	399	0	0	0	2	0	0
Indiana	0	0	0	129	103	166	0	2	1	4	2	1
Illinois	3	0	0	166	269	333	0	0	0	4	5	2
Michigan[2]	1	0	0	144	166	250	0	0	0	1	0	1
Wisconsin	4	1	0	62	166	280	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	1	0	0	75	61	96	0	0	0	1	0	0
Iowa	0	0	0	29	71	71	0	0	1	0	0	0
Missouri	1	0	0	46	77	117	0	0	0	4	0	1
North Dakota	0	0	0	5	3	19	0	0	0	1	0	0
South Dakota	0	0	0	9	23	23	0	0	0	0	1	0
Nebraska	0	0	0	49	43	67	0	1	1	0	0	0
Kansas	1	0	0	53	90	102	0	0	0	1	1	0
SOUTH ATLANTIC												
Delaware	0	0	0	8	8	8	0	0	0	0	0	0
Maryland[2]	0	0	0	26	119	119	0	0	0	0	0	1
District of Columbia	0	1	0	13	25	26	0	0	0	0	0	0
Virginia	2	3	1	50	135	63	0	0	0	4	4	1
West Virginia	0	0	0	17	36	36	0	0	0	0	0	0
North Carolina	0	0	1	41	42	42	0	0	0	0	0	0
South Carolina	0	3	0	9	9	9	0	0	0	0	0	0
Georgia	2	0	0	19	13	17	0	0	0	3	2	3
Florida	3	18	1	12	7	12	0	0	0	1	0	
EAST SOUTH CENTRAL												
Kentucky	0	1	1	37	31	73	0	0	0	0	3	
Tennessee	1	0	1	60	44	65	1	0	0	1	2	2
Alabama	0	0	0	14	16	20	0	0	0	0	0	0
Mississippi[2]	5	0	0	11	3	10	0	0	0	1	2	0
WEST SOUTH CENTRAL												
Arkansas	1	1	1	11	14	6	0	0	0	0	1	1
Louisiana	0	2	1	11	2	6	0	0	0	8	2	1
Oklahoma	0	0	0	6	17	27	0	0	0	1	0	0
Texas	1	1	1	67	74	79	0	1	1	3	3	4
MOUNTAIN												
Montana	0	4	1	3	10	35	0	0	0	0	0	0
Idaho	0	0	0	15	8	8	0	0	0	0	0	0
Wyoming	2	0	0	20	17	17	0	0	0	0	0	0
Colorado	0	0	0	75	44	53	0	0	0	0	2	2
New Mexico	0	0	0	6	5	10	0	0	0	0	0	0
Arizona	0	0	0	3	14	14	0	0	0	0	0	0
Utah[2]	0	0	0	14	29	38	0	0	0	0	0	0
Nevada	0	0	0	1	0	2	0	0	0	0	0	0
PACIFIC												
Washington	0	7	1	50	38	66	0	0	0	1	0	0
Oregon	2	0	0	38	26	26	0	0	0	0	0	1
California	15	6	3	148	227	227	0	1	0	13	3	3
Total	51	53	23	3,032	3,948	4,357	1	5	11	61	47	49
9 weeks	551	406	247	23,737	28,330	34,622	31	63	124	394	367	525
Seasonal low week[3]	(11th) Mar. 15–21			(32nd) Aug. 9–15			(35th) Aug. 30–Sept. 5			(11th) Mar. 15–21		
Total since low	25,326	13,743	12,323	50,423	66,901	73,718	85	139	241	3,922	4,618	5,661

[2] Period ended earlier than Saturday.
[3] Dates between which the approximate low week ends. The specific date will vary from year to year.
[4] Including paratyphoid fever reported separately, as follows: Massachusetts 1 (salmonella infection); Missouri 2; Georgia 2; Louisiana 1; Texas 1; California 13.

Telegraphic morbidity reports from State health officers for the week ended March 1, 1947, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Whooping cough			Week ended Mar. 1, 1947							
	Week ended—		Median 1942–46	Dysentery			Encephalitis, infectious	Rocky Mt. spotted fever	Tularemia	Typhus fever, endemic	Undulant fever
	Mar. 1, 1947	Mar. 2, 1946		Amebic	Bacillary	Unspecified					
NEW ENGLAND											
Maine	20	26	26								
New Hampshire	25		1								
Vermont	16	7	35								
Massachusetts	90	120	173		6						2
Rhode Island	11	58	33								
Connecticut	62	82	40				1			1	3
MIDDLE ATLANTIC											
New York	152	168	234	3	8		1				8
New Jersey	115	140	140	3				1			
Pennsylvania	175	113	171						1		
EAST NORTH CENTRAL											
Ohio	117	51	170							1	
Indiana	47	25	29				4				
Illinois	91	77	85	3			1		2		15
Michigan [2]	200	138	130	1					2		3
Wisconsin	187	81	81	1			1				10
WEST NORTH CENTRAL											
Minnesota	19	1	39								2
Iowa	2	14	14						1		57
Missouri	32	3	9						4		26
North Dakota	1		8								
South Dakota			1								
Nebraska	29	2	4				1				1
Kansas	20	37	44	1					1		3
SOUTH ATLANTIC											
Delaware	5	7									
Maryland [2]	47	19	38								1
District of Columbia	2	6	6								
Virginia	105	37	51	2		71			1		1
West Virginia	37	48	48								1
North Carolina	48	32	116						5	2	
South Carolina	22	52	54		13				1	1	
Georgia	67	25	25		3				1	16	2
Florida	45	6	23							1	
EAST SOUTH CENTRAL											
Kentucky	32	15	44								
Tennessee	21	4	24						3	1	1
Alabama	33	10	10							3	4
Mississippi [2]										1	1
WEST SOUTH CENTRAL											
Arkansas	29	16	16	2	2					2	1
Louisiana	19	2	2	8					1	1	3
Oklahoma	9	4	9				1	1			1
Texas	440	95	167	10	216	107				6	15
MOUNTAIN											
Montana	7	6	6								
Idaho	4	14	9								2
Wyoming		1	2								
Colorado	7	29	29								1
New Mexico	18	6	17	1	1	1					
Arizona	17	16	23			22					
Utah [2]	6	18	18						1		1
Nevada											
PACIFIC											
Washington	48	46	46	2		18					3
Oregon	13	10	13	1							
California	132	98	272	3	1					1	5
Total	2,624	1,765	2,393	41	245	219	10	2	24	37	173
Same week, 1946	1,765			41	195	63	5	0	14	22	70
Median, 1942–46	2,393			24	195	63	12	0	12	32	[5] 78
9 weeks: 1947	22,393			401	3,228	1,844	62	6	390	422	921
1946	16,161			363	2,623	1,018	66	3	189	460	573
Median, 1942–46	20,816			216	1,873	577	68	3	189	460	[5] 667

[2] Period ended earlier than Saturday.
[5] 2-year average, 1945–46.

Anthrax: New York 1 case.
Leprosy: California 1 case.

WEEKLY REPORTS FROM CITIES [1]

City reports for week ended Feb. 22, 1947

This table lists the reports from 87 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0	1	0	------	0	0	0	2	0	0	11
New Hampshire:												
Concord	0	0	------	0	------	0	0	0	0	0	0	------
Vermont:												
Barre	0	0	------	0	16	0	1	0	0	0	0	1
Massachusetts:												
Boston	10	0	------	0	18	1	15	0	21	0	0	20
Fall River	0	0	------	0	------	0	0	0	8	0	0	------
Springfield	2	0	------	0	4	0	2	0	4	0	0	7
Worcester	0	0	------	0	------	0	6	0	5	0	0	26
Rhode Island:												
Providence	0	0	1	0	145	0	4	0	8	0	0	9
Connecticut:												
Bridgeport	0	0	------	0	2	0	2	0	0	0	0	4
Hartford	0	0	------	0	3	0	1	0	2	0	0	2
New Haven	0	0	------	0	24	0	0	0	9	0	0	8
MIDDLE ATLANTIC												
New York:												
Buffalo	1	0	------	0	------	0	7	0	2	0	0	8
New York	12	0	7	2	125	4	65	0	141	0	0	53
Rochester	0	0	------	0	3	0	1	0	10	0	0	2
Syracuse	0	0	------	0	------	0	2	0	16	0	0	4
New Jersey:												
Camden	3	0	------	0	------	0	0	0	1	0	0	3
Newark	1	0	1	0	3	1	7	0	12	0	0	24
Trenton	0	0	------	0	25	0	3	0	6	0	0	1
Pennsylvania.												
Philadelphia	2	0	------	0	8	2	29	0	46	0	0	45
Pittsburgh	3	0	1	1	85	0	8	0	11	0	0	4
Reading	0	0	------	0	------	0	0	0	1	0	0	1
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	0	0	1	0	------	0	3	0	6	0	0	1
Cleveland	0	0	5	0	316	1	12	0	33	0	1	23
Columbus	1	0	------	0	3	0	3	0	11	0	0	------
Indiana:												
Indianapolis	0	0	------	0	1	1	5	0	32	0	0	56
South Bend	0	1	------	0	4	0	0	0	5	0	0	1
Terre Haute	0	0	------	0	------	0	2	0	2	0	0	------
Illinois:												
Chicago	0	0	------	2	47	3	34	0	43	0	0	34
Michigan:												
Detroit	1	0	1	0	12	0	11	1	48	0	1	80
Flint	0	0	------	0	------	0	3	0	4	0	0	9
Grand Rapids	0	0	------	1	2	0	0	0	14	0	0	4
Wisconsin:												
Kenosha	0	0	------	0	------	0	0	0	4	0	0	2
Milwaukee	0	0	------	0	5	0	3	0	17	0	0	54
Racine	0	0	------	0	------	0	0	0	3	0	0	12
Superior	0	0	------	0	1	0	1	0	2	0	0	------
WEST NORTH CENTRAL												
Minnesota:												
Duluth	1	0	------	0	------	1	3	0	2	0	0	1
Minneapolis	3	0	------	0	12	0	9	0	4	0	0	6
St. Paul	1	0	------	0	14	2	4	0	10	0	0	3
Missouri:												
Kansas City	0	0	------	0	1	0	2	0	4	0	0	3
St. Joseph	0	0	------	0	------	0	0	0	2	0	0	4
St. Louis	0	0	6	0	1	1	12	0	17	0	0	12

[1] In some instances the figures include nonresident cases.

City reports for week ended Feb. 22, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
WEST NORTH CENTRAL—continued												
Nebraska:												
Omaha	0	0	------	0	1	0	4	0	3	0	0	3
Kansas:												
Topeka	1	0	------	0	1	0	0	0	10	0	0	------
Wichita	0	0	------	0	------	0	2	0	7	0	0	1
SOUTH ATLANTIC												
Delaware:												
Wilmington	1	0	------	0	------	0	0	0	2	0	0	3
Maryland:												
Baltimore	3	0	2	0	7	1	8	0	9	0	0	71
Cumberland	0	0	------	0	2	0	0	0	0	0	0	------
Frederick	0	0	------	0	------	0	0	0	0	0	0	------
District of Columbia:												
Washington	1	0	1	1	11	0	10	0	11	0	0	9
Virginia:												
Lynchburg	0	0	------	0	------	0	2	0	0	0	0	------
Richmond	0	0	------	0	80	0	3	0	1	0	0	4
Roanoke	0	0	------	0	1	0	0	0	4	0	0	------
West Virginia:												
Charleston	0	0	------	0	------	0	0	0	1	0	0	------
Wheeling	0	0	------	1	------	0	1	0	0	0	0	------
North Carolina:												
Raleigh	0	0	------	0	5	0	0	0	0	0	0	6
Wilmington	1	0	------	0	6	0	1	0	0	0	0	------
South Carolina:												
Charleston	0	0	7	0	------	0	0	0	1	0	0	3
Georgia:												
Atlanta	0	0	20	0	2	0	3	0	6	0	0	------
Brunswick	0	0	------	0	------	0	0	0	0	0	0	------
Savannah	0	0	1	0	47	0	3	0	0	0	0	------
Florida:												
Tampa	1	0	5	0	2	0	2	0	5	0	0	------
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	2	0	6	0	1	1	9	0	8	0	0	10
Nashville	0	0	------	0	1	0	5	0	3	0	0	1
Alabama:												
Birmingham	2	0	3	0	5	0	4	0	3	0	0	2
Mobile	0	0	------	2	17	0	3	0	1	0	0	1
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	5	0	1	1	0	0	1	0	0	------
Louisiana:												
New Orleans	2	0	1	1	11	1	8	0	4	0	1	3
Shreveport	0	0	------	0	------	0	14	0	0	0	0	------
Oklahoma:												
Oklahoma City	1	0	5	0	------	0	0	0	0	0	0	1
Texas:												
Dallas	1	0	------	0	6	0	6	0	2	0	0	10
Galveston	0	0	------	0	------	0	1	0	0	0	0	------
Houston	1	0	------	0	------	0	6	1	3	0	0	------
San Antonio	3	0	1	0	2	0	4	0	1	0	0	4
MOUNTAIN												
Montana:												
Billings	0	0	------	0	------	0	2	0	0	0	0	------
Great Falls	2	0	------	0	175	0	0	0	1	0	0	------
Helena	0	0	------	0	9	0	0	0	1	0	0	1
Missoula	0	0	------	0	1	0	0	0	2	0	0	------
Idaho:												
Boise	0	0	1	0	------	0	1	0	0	0	0	------
Colorado:												
Denver	1	0	65	3	16	0	15	0	21	0	0	5
Pueblo	0	0	------	0	------	0	0	0	1	0	0	2
Utah:												
Salt Lake City	1	0	------	0	3	0	4	0	4	0	0	------

City reports for week ended Feb. 22, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle	0	0	------	0	4	0	3	0	7	0	0	2
Spokane	0	0	------	0	15	0	4	0	3	0	0	6
Tacoma	0	0	------	0	2	0	0	0	1	0	0	------
California:												
Los Angeles	13	0	4	1	8	2	6	1	26	0	0	24
Sacramento	1	0	------	0	4	0	0	0	4	0	0	2
San Francisco	2	0	1	0	7	0	3	0	15	0	0	1
Total	81	1	152	15	1,333	23	397	4	735	0	3	713
Corresponding week, 1946*	87	------	200	37	7,034	------	456	------	938	0	5	453
Average 1942-46*	70	------	226	[2] 44	[3] 4,579	------	[2] 470	------	1,590	1	10	689

[2] 3-year average, 1944-46.
[3] 5-year median, 1942-46.
*Exclusive of Oklahoma City.
Anthrax.—Cases: Philadelphia 1.
Dysentery, amebic.—Cases: New York 9; Memphis 1; Salt Lake City 1.
Dysentery, bacillary.—Cases: Worcester 1; New York 1.
Dysentery, unspecified.—Cases: Worcester 1; San Antonio 5.
Typhus fever, endemic.—Cases: Bridgeport 1; Baltimore 1; Tampa 2; Mobile 1; Dallas 1; Los Angeles 1.

Rates (annual basis) per 100,000 population, by geographic groups, for the 87 cities in the preceding table (latest available estimated population, 34,345,500)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England	31.4	0.0	5.2	0.0	554	2.6	81.0	0.0	154	0.0	0.0	230
Middle Atlantic	10.2	0.0	4.2	1.4	115	3.2	56.5	0.0	114	0.0	0.0	67
East North Central	1.2	0.6	4.4	1.9	243	3.1	47.9	0.6	139	0.0	1.2	172
West North Central	12.1	0.0	12.1	0.0	60	8.0	72.4	0.0	119	0.0	0.0	66
South Atlantic	11.7	0.0	60.1	3.3	272	1.7	55.1	0.0	67	0.0	0.0	160
East South Central	23.6	0.0	53.1	11.8	142	5.9	123.9	0.0	59	0.0	0.0	83
West South Central	20.3	0.0	30.5	2.5	51	5.1	99.1	2.5	28	0.0	2.5	46
Mountain	31.8	0.0	524.2	23.8	1,620	0.0	174.7	0.0	238	0.0	0.0	64
Pacific	25.3	0.0	7.9	1.6	63	3.2	25.3	3.2	89	0.0	0.0	55
Total	12.3	0.2	23.1	2.3	203	3.5	60.4	0.6	112	0.0	0.5	109

TERRITORIES AND POSSESSIONS

Panama Canal Zone

Notifiable diseases—January 1947.—During the month of January 1947, certain notifiable diseases were reported in the Panama Canal Zone and terminal cities as follows:

Disease	Residence [1]									
	Panama City		Colon		Canal Zone		Outside the Zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox	22		6		4		4		36	
Diphtheria	54	1					10		64	1
Dysentery:										
Amebic							1		1	
Bacillary	1		1		2		2		6	
Leprosy								2		2
Malaria [2]	17		3	1	49	1	50	5	119	7
Measles	8		9		6		1		24	
Meningitis, meningococcus					1				1	
Mumps			3		3				6	
Paratyphoid fever			1						1	
Pneumonia		8		5	16	1		2	[3] 16	16
Tuberculosis		17		6	3	2		8	[3] 3	33
Typhoid fever			1				3		4	
Typhus fever							1		1	
Whooping cough					2				[3] 2	

[1] If place of infection is known, cases are so listed instead of by residence.
[2] 11 recurrent cases.
[3] In the Canal Zone only.

DEATHS DURING WEEK ENDED FEB. 22, 1947

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Feb. 22, 1947	Corresponding week, 1946
Data for 93 large cities of the United States:		
Total deaths	9,741	9,474
Median for 3 prior years	9,474	
Total deaths, first 8 weeks of year	79,778	84,004
Deaths under 1 year of age	787	594
Median for 3 prior years	594	
Deaths under 1 year of age, first 8 weeks of year	6,583	4,854
Data from industrial insurance companies:		
Policies in force	67,313,350	67,171,224
Number of death claims	13,321	12,300
Death claims per 1,000 policies in force, annual rate	10.3	9.5
Death claims per 1,000 policies, first 8 weeks of year, annual rate	9.7	11.2

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended February 8, 1947.—During the week ended February 8, 1947, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		13		263	301	19	27	55	87	765
Diphtheria	1	2		19	7	4	1	1		35
Dysentery:										
Amebic					4					4
Bacillary				2						2
Unspecified					1					1
German measles				7	52	1	1	9	6	76
Influenza		60			7	6			1	74
Measles		137	4	209	56	286	102	437	482	1,713
Meningitis, meningococcus				3	2	2				7
Mumps		6		92	426	58	144	23	365	1,114
Poliomyelitis					2					2
Scarlet fever		10	3	77	98	11	2	11	11	223
Tuberculosis (all forms)		10	20	89	31	13	19	20	42	244
Typhoid and paratyphoid fever		2		6	4					12
Undulant fever				1	1			3		5
Venereal diseases:										
Gonorrhea	3	15	11	76	89	37	14	39	59	343
Syphilis	3	3	7	105	67	18	18	16	38	275
Whooping cough		27	3	79	93	15	2	8	22	249

CUBA

Habana—Communicable diseases—3 weeks ended January 25, 1947.—During the 3 weeks ended January 25, 1947, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Chickenpox	1		Tuberculosis	3	1
Diphtheria	16	1	Typhoid fever	11	
Measles	8				

Provinces—Notifiable diseases—4 weeks ended January 25, 1947.—During the 4 weeks ended January 25, 1947, cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana [1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer	10	8	16	17	4	22	77
Chickenpox		2					2
Diphtheria	1	25		4	2	1	33
Leprosy		7				1	8
Malaria		4		2	4	87	97
Measles		12					12
Poliomyelitis	6	4		2	1	1	14
Tuberculosis	28	24	15	44	10	49	170
Typhoid fever	8	37	5	20	5	35	110
Whooping cough					1		1

[1] Includes the city of Habana.

FINLAND

Helsinki—Measles epidemic.—Information received on February 4, 1947, states that a current epidemic of measles in Helsinki, Finland, was causing some concern to the health authorities. It was also stated that measles epidemics are serious in Finland, as "active tuberculosis and other serious ailments are concomitants" of the disease.

JAMAICA

Notifiable diseases—4 weeks ended February 8, 1947.—During the 4 weeks ended February 8, 1947, cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Cerebrospinal meningitis	2	2	Puerperal sepsis		1
Chickenpox	12	14	Scarlet fever		1
Diphtheria	3	1	Tuberculosis (pulmonary)	44	61
Dysentery, unspecified		9	Typhoid fever	15	76
Leprosy		3	Typhus fever (murine)	1	

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

Siam (Thailand).—For the week ended February 8, 1947, 166 cases of cholera with 106 deaths, including 15 cases of cholera with 5 deaths reported in Bangkok, were reported in Siam.

Plague

Brazil.—Plague has been reported in Brazil as follows: For the month of June 1946, Ceara State, 15 cases, 1 death; Pernambuco State, 3 cases; Sergipe State, 1 case; for the month of July 1946, Bahia State, 1 case; Ceara State, 24 cases, 6 deaths; for the month of August 1946, Bahia State, 1 case, 1 death; Ceara State; 37 cases, 7 deaths.

Burma.—For the week ended February 8, 1947, 125 cases of plague with 95 deaths were reported in Burma.

Java.—According to press reports, not officially confirmed, the prevalence of both bubonic and pneumonic plague was reported in central Java during 1946 as follows: Adikarto regency, 33 deaths;

Bantoel regency, 278 deaths; Djocjakarte, 907 deaths; Koelonprogo regency, 23 deaths; Slemen regency, 445 deaths; Wonosari regency, 723 deaths; a total of 2,409 deaths. Pneumonic plague was reported in Soekaboemi area, Proenger district in western Java.

It is stated that plague first appeared in epidemic form in Djocjakarte during 1945, when efforts of the Japanese to retard it were said to have been ineffective. Plague has been endemic in the Preanger district for many years, but it was stated that the Dutch sanitary measures were able to keep it from spreading. It was also stated that the Dutch authorities fear that the disease may spread rapidly in the interior of Java.

Peru.—Plague has been reported in Peru as follows: For the month of October 1946, Lima Department, 1 case; Piura Department, 19 cases, 2 deaths; for the month of November 1946, Libertad Department, 1 case; Lima Department, 3 cases; Piura Department, 22 cases, 2 deaths.

Smallpox

Malay States (Federated)—Trengganu.—For the week ended February 22, 1947, 218 cases of smallpox with 41 deaths were reported in Trengganu, Federated Malay States.

Uruguay.—According to a report dated February 19, 1947, 138 cases of smallpox (alastrim) have occurred in Uruguay during the past few months. The outbreak is said to be declining.

Typhus Fever

Colombia.—For the month of January 1947, 127 cases of typhus fever with 3 deaths were reported in Colombia.

Yellow Fever

Colombia.—Yellow fever has been reported in Colombia as follows: Caldas Department—La Dorado, January 22, 1947, 1 death; Cundinamarca Department—Caparrapi, January 19, 1947, 1 death; Santander Department—Barranca Bermeja, December 30, 1946, 1 death; Lebrija, January 16, 1947, 1 death; Rio Negro, January 1–20, 1947, 3 deaths; San Vincente de Chucuri, January 1–11, 1947, 4 deaths; Simacota, January 2–10, 1947, 3 deaths; Tolima Department—Armero, January 22, 1947, 1 death.

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UNITED STATES PUBLIC HEALTH SERVICE

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THE USE OF DDT TO CONTROL MURINE TYPHUS FEVER IN SAN ANTONIO, TEXAS [1]

By DAVID E. DAVIS, *Senior Assistant Sanitarian (R), United States Public Health Service* [2]

INTRODUCTION

This paper describes the results of an experimental program in San Antonio designed to reduce the number of cases of typhus fever by controlling the fleas on rats. Previous experiments (*1*) have shown that the application of DDT (dichlorodiphenyltrichloroethane) to rat runs, burrows, and harborages reduces the number of fleas found upon the rats. The aim of those experiments was to find a method for controlling murine typhus fever by reducing the rat-flea population. Of several insecticides tested, DDT was found to be the most suitable for this purpose. After the demonstration that the fleas on rats can be controlled, it remained to determine if the number of cases of typhus fever can be diminished by dusting DDT in buildings of cities or towns.

TYPHUS FEVER IN SAN ANTONIO

San Antonio was selected as a suitable city for this experiment because a comparatively large number of cases had occurred there in recent years. A total of 32 cases was recorded in 1943 and 91 cases were reported to the health department in 1944. Furthermore, trapping of rats had been conducted in various parts of the city and thus the distribution of typhus in rats was known in some detail. The spatial distribution of cases of human typhus and the occurrence of typhus in rats are discussed elsewhere (*2*).

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The City of San Antonio has a population of about 450,000 at the present time, although the 1940 census gives a total of 315,000. The recent increase is due to the influx of war workers and to the annexation of several suburbs. The city has a good downtown business district containing several tall modern buildings. The northern part of town is an extensive, good residential area of small homes. The eastern section of the city also is residential, and contains the Negro section and some slum areas. The southern and western parts of San Antonio may be classified as fairly prosperous residential areas. Adjacent to the business district on the southwest side is an area inhabited largely by poor persons where sanitary and housing conditions are very inadequate. However, three slum-clearance projects have cleaned up a certain amount of this district. On the northern borders of this district are the produce markets and a slum business district containing warehouses and small grocery and poultry stores. The grain mills are located in two sections of the city. One group is found along the railroad tracks in the slum district and the other group of mills is placed along the Southern Pacific tracks east of the main business area. There are many small shopping centers scattered throughout the residential areas consisting usually of one or two drug stores, three or four grocery stores and several other small shops.

Two control measures have been in effect for some time. The first is a United States Public Health Service typhus-control program, consisting of rat proofing and eradication of rats in the business district. This work had eliminated the rats from about eight blocks in the downtown shopping sections, which contain many tall buildings. Results indicate that this program has definitely prevented the recurrence of typhus cases such as originated in this area in 1944. It is certain that this rat proofing did not interfere with the interpretation of the experimental dusting of another section of San Antonio.

Another control measure is the poisoning of rats by the Fish and Wildlife Service in cooperation with the junior chamber of commerce and the health department. This poisoning has been carried out since 1941 throughout the whole city and was designed primarily to reduce the economic damage caused by rats and, therefore, was done almost exclusively at stores and mills. In addition to distributing poison to business houses, the Fish and Wildlife Service also uses red squill rat poison in a nine-block area around the supposed source of typhus. This procedure has also been carried out since 1941. After the beginning of the dusting program, all poisoning was stopped in the experimental dusted area, but poisoning was continued in the undusted area. Because such poisoning in previous years had failed to halt the increase of the number of typhus cases, it was felt that the continuance of poisoning in the undusted area would have little effect on

the experiment and that it was desirable to continue the poisoning operations in order to maintain the cooperation and good will of the agencies concerned. In addition to this professional work, many residents buy poison or traps and kill some rats, but such efforts are so local and sporadic that the abundance of rats is reduced only temporarily.

PROCEDURE AND ORGANIZATION OF DUSTING

The area selected for experimental dusting consisted of the southwestern one-third of the city (maps 1 and 2). This section was chosen because in previous years the number of typhus cases in this district was higher than in any other compact area of the city. The slum area (north-east part) was dusted with DDT first, then the southern section, and then the western section. The area was primarily residential but had some small shopping centers and many corner grocery stores. About 10 percent of the premises dusted were commercial. The rats were found inside the houses, in stores, and in garages. Chicken coops were common in this district and frequently harbored many rats.

It will be noted from the maps that the commercial district within the experimental area was not dusted. This district forms a T, extending east-west along Commerce Street and north-south along the railroad tracks. This commercial area was omitted because it would have required so much time and it would have been difficult to trace the source of typhus cases in this district.

The rest of the city was not dusted, and the eastern part served as a control. Fortunately, it was possible to select a boundary line by using the river, several parks and the commercial district, so that the two areas were clearly separated except on the northern side. The dusted and undusted areas were not strictly comparable because of the presence of the slum area in the experimental section. One small section of the undusted area, located just east of the northern part of the dusted area, was similar to the slum district. This small section was densely populated and had poor housing and sanitary conditions. However, the other parts of the two areas were comparable and no better division of the city was possible. The populations of the two areas were not known but seemed to be about equal.

Because the northern section was not comparable to the dusted area, it has been excluded from the final conclusions, but it is discussed fully in this report for the sake of completeness.

The experiment is considered to have begun on May 21, 1944, when investigations of murine typhus fever in the city were started. The dusting began April 4, 1945, and ended August 31, 1945. Investigations of the cases continued until October 15, 1945. The

experiment was ended then because the maximum typhus season was over, and the DDT, as indicated by flea indices, was no longer effective in killing fleas. Furthermore, DDT became available to the general public and hence there was no longer a "control" area, because DDT was being used extensively.

In order to eliminate the fleas on rats, it was necessary to spread DDT thoroughly in all rat runs, burrows, and harborages. A mixture of 10 percent DDT and 90 percent pyrrophyllite was used throughout the work. The dust could be dispersed with any insecticide pump. Pumps which had a cylinder containing 2 to 5 pounds of material were best because this size obviated frequent refilling. In addition, a small screw-topped bottle with holes punctured in the cover was necessary for use on overhead runs and for putting dust in small holes. A flashlight was also required. The inspectors put dust in every place where the rats occur. Cats and dogs were also routinely dusted. At the beginning, it was difficult to obtain good men and teach them the habits of rats so that no runs were overlooked.

The dusting program in San Antonio was combined with an inspection for *Aedes aegypti* mosquitoes and a general sanitation survey. In order to facilitate the work of the inspectors, a preliminary visit was made to the houses by volunteers organized by various welfare agencies, called the Baby Diarrhea Council. These volunteers were primarily interested in education aimed at the prevention of infant diarrhea and, in addition, explained to the householder that an inspector would follow in a few weeks. These preliminary visits assisted the workers greatly in many areas. Although the inspector was also concerned with mosquito eradication and general sanitation, this report describes only the work related to the reduction of fleas and its effect on typhus fever.

Each inspector carried a clip board with sheets containing entries for the various items and went from house to house, covering all blocks systematically. The inspector noted down on his tally sheet whether the premise had no rats or a light or heavy infestation of rats and also the number of rooms dusted. This last figure was a rough approximation; a garage, an attic, a chicken coop, etc., were each considered as one room. If the house was closed or if the householder was uncooperative, the address was noted and a special man returned to these houses on another day to put out the DDT, if possible. Sometimes two or three return visits were necessary to find someone at home. Since it was found that on rainy days the householders objected to having dirt tracked into the house, the crew inspected and dusted stores and business establishments in the shopping centers and in the slum business district during bad weather. Fortunately, there were few rainy days. The area treated with DDT was primarily

residential, but all corner groceries and other stores in all shopping centers were inspected. Large factories and mills were omitted. About 2,500 local stores were inspected and dusted.

The operating cost of the dusting program was analyzed by Vinton W. Bacon, Assistant Sanitary Engineer (R) of the United States Public Health Service. It will be remembered that the DDT program was part of an *aegypti* mosquito-control and sanitation survey. Therefore, the operating costs of the DDT portion were estimated from the total costs. The figures presented in table 1 cover the period

TABLE 1.—*Operation and costs of San Antonio DDT-dusting program (Apr. 4–July 31, 1945)*

Item	Number or amount	Item	Cost
Premises inspected, residential and business	22,028	Program operating costs:	
Rooms dusted with 10-percent DDT	23,099	Supervision	$855.00
DDT used (pounds)	6,145	Secretarial	224.00
Per premises	.28	Labor	3,294.00
Per room	.27	Auto	336.00
Premises worked per man-day	48	DDT	799.00
Rooms worked per man-day	50	All operating items	5,508.00
		Operating cost per premise	.25
		Operating cost per room	.24

from April 4 to July 31, 1945. Approximately 5,000 more premises, covered in the month of August, are not included because, due to vacations and changes in personnel, the costs are not representative.

These costs do not include allowance for "before and after" trapping and counting of fleas as a check on the thoroughness of dusting. Although this method was used for experimental purposes in San Antonio, it is believed that it is far more economical and faster to have the foreman check the work by close supervision.

To summarize the operating expenses, it can be said that the program cost an average of 25 cents for each place and that 3 tons of 10-percent DDT was used for 22,000 premises, mostly residential.

FLEA INDICES BEFORE AND AFTER DUSTING

In order to check the efficiency of the work of the crew, rats were collected before and after dusting. It must be emphasized that the flea indices from these rats are a measure of the efficiency of the crew; they are not a measure of the efficiency of DDT. From our experience, we have become satisfied that when DDT is thoroughly and carefully put out, the number of fleas can be reduced almost to zero. The flea indices recorded here include rats trapped in premises which were dusted by inexperienced men, rats trapped at several establishments which were not dusted, due to misunderstandings, and rats trapped in premises which were dusted by men who were subsequently dismissed for incompetence.

Both roof rats (*Rattus rattus*) and brown rats (*Rattus norvegicus*) were present in the area. The roof rats tended to frequent houses and stores. The brown rats were most common in chicken coops and in grocery stores with wooden floors. The total numbers were about equal in the area, but the distribution was very irregular. The rats were collected alive in steel traps and combed for ectoparasites. The traps were set in houses or stores about a week before dusting and then about a week after dusting. The rats did not necessarily come from the same premises before and after dusting, but did come from the same area. Thus, in any one month the flea indices before and after dusting with DDT were calculated on the basis of rats caught within a small area.

Table 2 shows the monthly flea indices for rats trapped before and

TABLE 2.—*Flea indices before and after dusting with DDT*

Species, time, and place	Number of rats combed	Number of fleas per rat	Percentage of rats infested	Number of rats combed	Number of fleas per rat	Percentage of rats infested	Number of rats combed	Number of fleas per rat	Percentage of rats infested
	April 1945			May 1945			June 1945		
BEFORE DDT									
Rattus rattus	67	3.1	79	44	2.1	61	32	3.6	78
Residences	38	2.5	79	26	2.8	61	22	3.0	86
Stores	29	3.9	79	18	1.1	61	10	5.0	60
Rattus norvegicus	41	8.5	85	28	10.8	78	33	18.3	91
Residences	34	9.7	85	21	8.6	76	15	18.8	100
Stores	7	2.7	86	7	17.5	86	18	17.8	83
AFTER DDT									
Rattus rattus	9	2.8	66	38	2.3	37	70	1.5	43
Residences	6	2.2	50	33	1.1	39	50	1.7	40
Stores	3	--------	--------	5	10.0	20	20	.8	50
Rattus norvegicus	5	8.6	100	11	9.1	91	36	3.2	69
Residences	4	--------	--------	11	9.1	91	29	3.5	69
Stores	1	--------	--------	0	0	0	7	2.3	71
	July 1945			August 1945			September 1945		
BEFORE DDT									
Rattus rattus	9	1.4	66	37	11.0	43	No rats trapped before DDT		
Residences	4	--------	--------	6	.7	50			
Stores	5	7.0	80	31	13.0	42			
Rattus norvegicus	42	3.6	64	43	12.0	84			
Residences	14	5.6	79	25	10.2	76			
Stores	28	2.6	57	18	14.8	95			
AFTER DDT									
Rattus rattus	88	.8	22	No rats trapped after DDT			42	.3	21
Residences	66	.8	21				19	.2	21
Stores	22	.8	23				23	.4	22
Rattus norvegicus	35	2.2	51				173	4.0	75
Residences	26	2.3	42				80	3.7	70
Stores	9	2.1	78				93	4.2	80

after dusting. Adult and young rats are grouped together because there was no consistent difference in the flea indices for these two age classes. Rats caught in stores were separated from rats caught in residences because the ecological conditions differed. "Fleas per rat"

refers to the number of fleas divided by the number of rats combed. "Percentage infested" refers to the number of rats with fleas divided by the number of rats combed. Both indices are recorded as recommended by Rumreich and Wynn (*3*). These monthly indices are not consolidated into one figure for all months because it is desirable to indicate the seasonal variation in the abundance of fleas. The indices for September (after DDT) are based on rats caught in an area which had been dusted 4 months previously.

The fleas belonged to the species *Xenopsylla cheopis* primarily, but included some *Leptosylla segnis* in April, May and June. In some cases, individuals of *Ctenocephalides felis* (cat flea), *Echidnophaga gallinacea* (chicken flea), and *Nosopsyllus faciatus* were present, but are not included in the table because of their rarity. This table shows that during the first month of the work there was only a small reduction in the number of fleas found on rats. This poor result was due to the inexperience of the crew and to the difficulty in finding suitable men for the work. The drop in flea counts for June showed considerable improvement In July, the number of fleas was decreasing due to normal seasonal changes, and hence the drop in abundance after dusting was not very noticeable. Because of this normal decrease, trapping after dusting was abandoned in August. In September, rats came from an area dusted in June, and the fleas on brown rats were as abundant as would be expected at that season. The fleas on roof rats were less common than would be expected at that season. It should be noted that the "after DDT" indices are about the same as the normal indices in the winter season.

PRESENCE OF COMPLEMENT-FIXING ANTIBODIES IN RATS

In order to measure the results of dusting DDT for the control of typhus in rats, a large number of rats was collected from the slum area in the months of May and June and again in September. The aim of this survey was to determine whether the reduction in the number of fleas resulted in a decrease in the prevalence of typhus in rats. Table 3 shows the percentages of complement-fixing antibodies in rats found in the slum area in May to June 1945 and in the same region in September 1945. Rats were collected in both residences and stores, but are grouped in the calculation of the "percentage positive" because no consistent difference in the presence of antibodies was apparent. For comparison, the table shows data from undusted grain mills for a similar period.

The adult brown rats showed a slight drop in the percentage of rats positive for antibodies between June and September. It should be remembered that many of the rats caught in September were a year or more old and could have become infected many months previously.

TABLE 3

Percentages of rats having antibodies before and after DDT

Species	Before DDT (May to June)		After DDT (September)	
	Number of rats bled	Percentage positive	Number of rats bled	Percentage positive
Rattus rattus:				
Adults	45	47	8	50
Young	42	12	22	0
Rattus norvegicus:				
Adults	43	70	65	52
Young	29	31	76	5

Presence of antibodies in rats caught in undusted grain mills

Species	March to April		September	
	Number of rats bled	Percentage positive	Number of rats bled	Percentage positive
Rattus rattus:				
Adults	7	57	10	20
Young	7	14	9	33
Rattus norvegicus:				
Adults	45	62	19	67
Young	11	54	17	29

On the other hand, the young rats in which antibodies were found indicate the presence of typhus within recent months, and it will be noted that there was a considerable decrease in the prevalence of antibodies in young rats in the 3 months after dusting.

The rats caught in grain mills were intended to serve as a control to indicate any seasonal changes which may have occurred in the prevalence of antibodies, but unfortunately it was impossible to obtain significant numbers of rats. However, it should be noted that the prevalence of antibodies in young rats was high for September in the undusted grain mills. Studies in other parts of the city gave no indication of a seasonal variation of antibodies in rats, but it would be expected that in September, after the maximum abundance of fleas, there would be an increase in prevalence of antibodies. The change 3 months after dusting, however, was in the direction of a decrease in prevalence, especially in young rats.

OCCURRENCE OF TYPHUS CASES 1944–45

From the beginning of this experiment on May 21, 1944, only those cases confirmed by laboratory tests have been considered. After May 21 in 1944, 12 cases without laboratory confirmation were reported, mostly in June. Seven cases reported to the health department in 1945 have been omitted because of the lack of laboratory tests.

In May 1944, an effort was made to improve the reporting of cases by having interviews with physicians and by cooperation with the local medical society. In July 1945, a physician specializing in the epidemiology of typhus was assigned to the health department. He made a special effort to confirm all reported cases by laboratory tests and succeeded in checking the diagnosis of nearly every case reported in the city. Reporting was again stimulated by interviews with individual physicians and the cooperation of the Bexar County Medical Society and the local hospitals. The cooperation of these physicians and the medical society is greatly appreciated.

After a case had been reported to the health department, an epidemiological investigation was made to determine the origin. Information was obtained by the epidemiologist from the patient or members of the family about the place of work, stores visited, and trips out of town. Then an investigation for rats was made at the indicated buildings. Wherever possible, rats were trapped and their blood tested for complement-fixing antibodies. From these data, the probable source of infection was determined.

Frequently, it was clear that infection was acquired at home or at work. In other instances, it could be determined that the patient had become infected within a limited area near the residence, if not at the residence. Such cases were listed as of unknown origin. For several cases, no source could be determined because the patient traveled about the city or lived out of town. A typical case of unknown origin was a mayonnaise salesman who lived in a house free of rats and pets and who visited innumerable restaurants. Another type of undetermined origin was that of a woman who had a cat but no rats at home, bought groceries in a heavily infested store nearby, and ate regularly in a heavily infested cafe. In interpreting the maps, it should be noted that a circle represents the residence of a case of unknown origin. However, the residence was probably not the source because an inspection did not reveal any evidence of rats or pets. In many of these instances, it was nevertheless clear that the person had become infected in the neighborhood.

An analysis of the typhus cases from May 21, 1944 to October 12, 1945 is presented in table 4. The cases are grouped according to the date of onset into 4-week periods in order to show the seasonal changes in incidence. The cases are listed according to the probable source of infection. In the table, the experimental area (see maps) refers to the southwestern part of San Antonio, most of which was dusted from April to August, 1945. "Untreated area" refers to the rest of the city. The column "control" refers to the area used for comparison with the treated area. The column "northern" refers to cases contracted in the northern part of the city which is not considered a part of the experi-

TABLE 4.—*Probable source of typhus cases (1944–45) according to date of onset of disease*

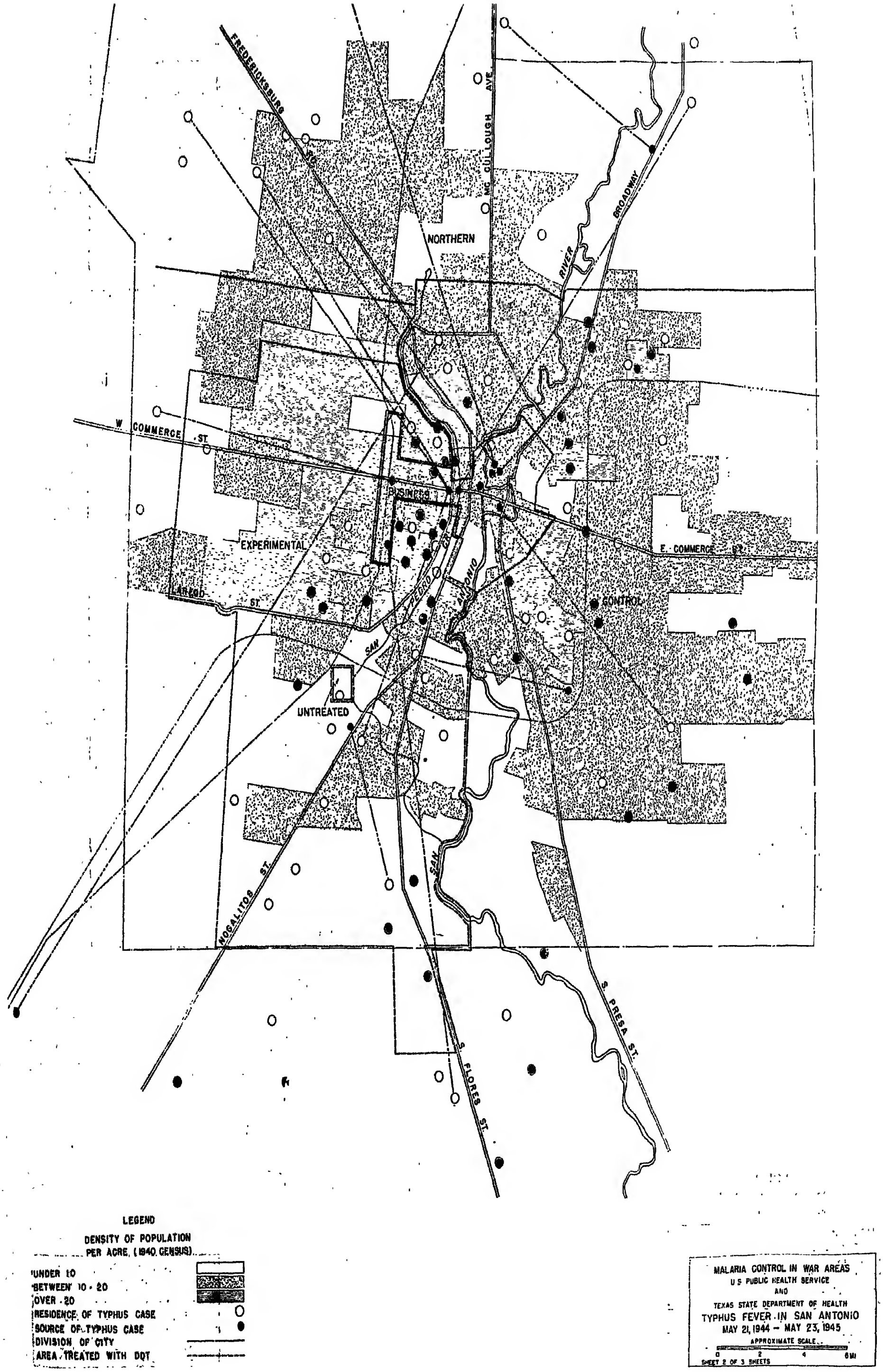
Date of onset of disease	Number of cases in experimental area: Before DDT	Number of cases in experimental area: After DDT	Number of cases in untreated area: Control	Number of cases in untreated area: Northern	Number of cases in untreated area: Business	Number of cases of unknown source	Grand total
1944							
May 21–June 17	0	----------	0	0	0	0	0
June 18–July 15	0	----------	0	0	0	3	3
July 16–Aug. 12	3	----------	2	0	2	6	13
Aug. 13–Sept. 9	4	----------	4	0	2	5	15
Sept. 10–Oct. 7	1	----------	3	0	2	8	14
Oct. 8–Nov. 4	3	----------	3	0	4	5	15
Nov. 5–Dec. 2	3	----------	3	0	1	2	9
Dec. 3–Dec. 31	3	----------	2	0	0	2	7
1945							
Jan. 1–28	1	----------	2	0	1	4	8
Jan. 29–Feb. 26	2	----------	2	0	0	2	6
Feb. 27–Mar. 27	0	----------	1	0	0	0	1
Mar. 28–Apr. 24	[1] 0	[2] 0	0	0	0	3	3
Apr. 25–May 23	2	0	1	1	0	1	5
May 24–June 20	1	0	2	2	4	1	10
June 21–July 19	1	3	4	0	0	2	10
July 20–Aug. 16	3	0	5	3	0	7	18
Aug. 17–Sept. 14	2	0	7	1	0	5	15
Sept. 15–Oct. 12	1	1	4	1	2	0	9

[1] The cases in this column after Apr. 4, 1945, occurred in parts of the experimental area which had not yet been treated with DDT.
[2] Dusting begun Apr. 4, 1945.

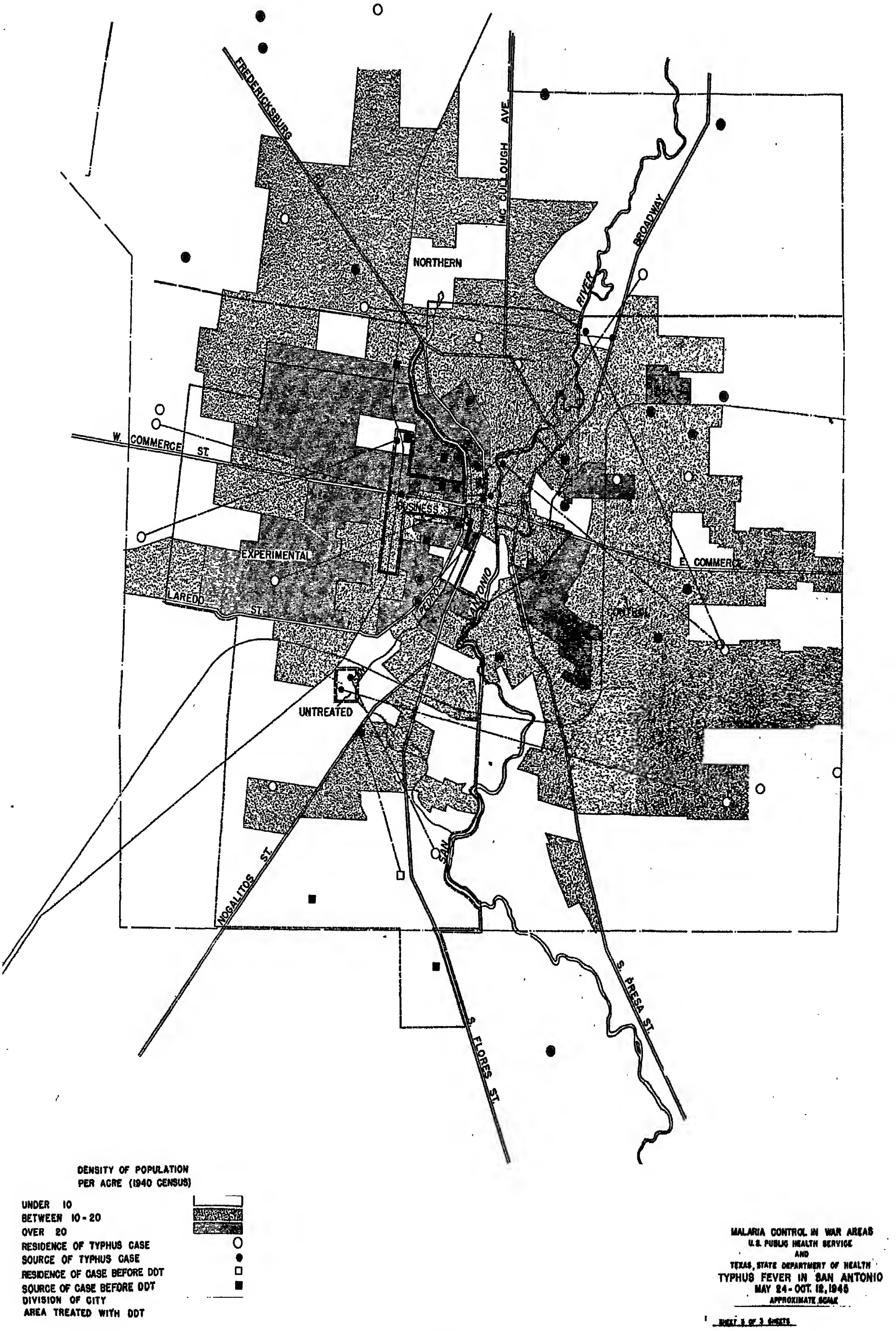
ment. The column "business" includes cases apparently contracted in the downtown business area and in the stock yards. The column "unknown source" includes cases of unknown origin.

The maps show the various areas of the city and indicate the density of population by degrees of shading. The area actually dusted is indicated by the wide border line. (Note the T-shaped commercial district and the stock yards which were excluded.) A spot indicates the source of infection. A circle indicates the residence of a case. Hence a spot within a circle indicates that infection was acquired at home. A spot tied to a circle indicates the residence and also the source of infection. A circle without a spot indicates the residence of a case of unknown origin.

Maps 1 and 2 show the areas used for the experiment and the density of population by shading. The experimental area and the control areas were selected as being as similar as possible in regard to the number of cases in 1944 and the number of inhabitants. Map 1 shows all confirmed cases occurring between May 21, 1944, and May 24, 1945. This map thus includes one season of typhus fever before the dusting began. Map 2 shows by circles the cases occurring after dusting in the experimental area and after May 24, 1945 in the untreated area. The squares in map 2 indicate cases which occurred in the experimental area after the program started but before the crew got to the particular spot. May 24 was chosen as the initial date because few cases occurred before this date in 1945. This map, thus, contrasts


FREDERICKSBURG RD.
MC CULLOUGH AVE.
NORTHERN
BROADWAY
RIVER
W. COMMERCE ST.
BUSINESS
EXPERIMENTAL
E. COMMERCE ST.
LAREDO ST.
CONTROL
SAN PEDRO
SAN ANTONIO
UNTREATED
NOGALITOS ST.
SAN
S. FLORES ST.
S. PRESA ST.
LEGEND
DENSITY OF POPULATION
PER ACRE, (1940 CENSUS)
UNDER 10
BETWEEN 10 - 20
OVER 20
RESIDENCE OF TYPHUS CASE
SOURCE OF TYPHUS CASE
DIVISION OF CITY
AREA TREATED WITH DDT
MALARIA CONTROL IN WAR AREAS
U S PUBLIC HEALTH SERVICE
AND
TEXAS STATE DEPARTMENT OF HEALTH
TYPHUS FEVER IN SAN ANTONIO
MAY 21, 1944 — MAY 23, 1945
APPROXIMATE SCALE
0
2
4
6 MI
SHEET 2 OF 3 SHEETS

MAP 1



MAP 2

(Back map 1)

the treated and the untreated areas. Because of the impossibility of dusting the whole experimental area at one moment, it has been very difficult to show the occurrence of cases clearly. These maps attempt to show the distribution of typhus cases before dusting (map 1) and after dusting one part of the city (map 2).

CASES IN THE EXPERIMENTAL AREA

From May 21, 1944, up to the beginning of dusting, 20 proven cases of typhus are known to have been contracted in the area, which was subsequently dusted in 1945. Dusting began on April 4, 1945, and progressed throughout the area. Since the whole area could not be dusted at once, cases occurred after dusting began but before the crew got to that particular place. Ten such cases were recorded (table 4). In addition, 4 cases of unknown actual source were contracted somewhere in the area which was subsequently dusted. The most densely populated and the worst typhus area was dusted first and was covered before the typhus season really began. The less critical parts were treated in July and August.

From table 4, it will be noted that only four cases occurred after DDT was applied. One of these cases occurred 19 weeks after the house was dusted, a period which allows ample time for the fleas to return to normal abundance. Two cases occurred in houses which were not dusted due to negligence on the part of the inspector.

Another method of examining the data is to consider the progression of dusting throughout the area in relation to the cases occurring during the work (table 5). These cases are indicated in map 2 as squares.

TABLE 5.—*Progression of dusting in area covered*

Date	Area dusted		Area not yet dusted	
	Number of premises [1]	Number of cases [1]	Number of premises [1]	Number of cases [1]
April 4	0	0	26,832	0
April 28	1,856	0	24,976	1
May 26	6,309	0	20,523	3
June 30	11,488	1	15,344	5
July 28	19,486	3	7,346	5
August 31	26,832	3	0	8

[1] Cumulative totals.

(Note that the crew never got to the area in which two cases occurred.) From the table, it is seen that eight cases occurred in the ever-decreasing area not yet covered, whereas three cases occurred in the ever-increasing area covered. It should be noted (see "grand total," table 4) that few cases occurred in the city before June, and that the worst typhus sections were covered before June.

Three cases occurred in undusted blocks on the border of the experimental area before the crew arrived. They are located on map 2 on the northern edge of the commercial district. All of these cases were housewives who lived in a poorhouse heavily infested with rats and fleas. Another case occurred in a block on the southern edge of town which was omitted at first because it contained only three houses.

Two persons lived in the experimental area but probably became infected elsewhere. One case lived in a house which was well dusted and had rats without fleas. He worked in a heavily infested cafe in the undusted business district. Another man lived in a house in the dusted area and worked in a rat-infested dance hall in the undusted district. His house had no rats or pets. It is possible that he became infected in the dance hall where his work consisted of sweeping up each morning.

Two cases of unknown origin lived in the experimental area. One case was a young girl who lived in a good residential district. There were no rats on the premises, and the garage had been thoroughly dusted because of the presence of mice. The girl had a dog but had used DDT to eliminate fleas the day she got the dog. She frequently visited a friend in another part of town who had a cat, and she complained of getting fleas there. The origin of this infection is obviously difficult to determine. The other case was a boy who worked all over town.

No case which was diagnosed clinically as typhus but which lacked confirmatory laboratory tests originated in the dusted area.

CASES IN THE UNTREATED AREA

Table 4 shows that 23 cases occurred in the control area at the time the experimental area was being treated. The persons became infected in their homes or chicken yards or in the stores in the undusted area. It will be noted that in 1944 the cases in the experimental area were about equal in number to the cases in the control area.

It is of additional interest to note that seven cases occurred in the small undusted slum area just east of the northern part of the treated area. These few blocks resemble the dusted slum area of about 60 blocks which in previous years has always produced many cases but which in 1945, after dusting, produced only 4 cases.

The cases of unknown origin which lived in the untreated area were five housewives who surely became infected near home, four salesmen who worked all over town, and four men who worked outside of the dusted area. Thus, none of these unknowns worked regularly in the dusted area.

DISCUSSION

The occurrence of human typhus cases in the dusted area shows emphatically the necessity for dusting every part of every house which contains rats. In actual practice, it was found best to instruct the inspectors to dust every place which could have had rats at that time or which might have had rats in the past. However, the more thoroughly trained inspectors were able to put the dust in the proper places and not scatter it widespread. Nevertheless, since dust is cheap and labor is expensive, in general practice it will be found best to put out a lot of dust and expect that most of it will get into the right places.

The collection of rats before and after dusting was of surprisingly little value as a check upon the work of the inspectors. In an experimental study of this type, it did have value by again showing that DDT will control flea population and by giving evidence that the number of fleas was reduced in the experimental area. However, for programs in other cities, the chief value of trapping rats before and after dusting is to check on the work of the inspectors. But such policing can be done much more cheaply by the foreman of the crew. He should spend part of each day going back over the work done in previous days, to inquire of the householder whether the inspector was present, and to look carefully to see that the inspector put out DDT in all places. Such policing is absolutely necessary to the success of dusting programs.

The problems of transportation, policing, and dusting are facilitated if each inspector is assigned an area of several blocks (perhaps 10 to 15) and then works there until it is completely dusted.

The encouraging results of this experiment in San Antonio suggest that DDT may be an additional method for controlling typhus fever. However, dusting must be repeated at intervals and would be very expensive in some towns and especially in rural areas. The fundamental rat eradication procedures of general sanitation, ratproof construction, and rat poisoning must be continued in order to eliminate rats. DDT should be considered as an auxiliary method applicable to areas which cannot be economically ratproofed or to outbreaks of typhus which must be speedily controlled.

DDT should be used before poisoning to reduce the number of fleas, and ratproofing and complete eradication of rats should follow. In areas where ratproofing is impracticable, or for emergencies, DDT should be dusted first and then poison put out about a week later. This "one-two" treatment is especially suitable for residential areas.

Much additional work needs to be done to evaluate definitively the place of DDT in the control of murine typhus. This preliminary

experiment lacked adequate epidemiological studies before the DDT was applied. Thorough evaluation studies in other cities, in villages, and in rural areas in other parts of the United States will be required to confirm the encouraging results of this experiment. Such unknown factors as the possibility of transmission by mites, by inhalation, and by fleas from domestic pets must be examined.

It is of interest to note that the control of typhus fever by reducing the arthropod vector is similar to the methods of controlling other insect-borne diseases. In some diseases, it may be easier and cheaper to reduce the insect vector than the vertebrate reservoir.

ACKNOWLEDGMENTS

A program of this type naturally requires the collaboration of many men and agencies. Dr. C. R. Eskey, formerly Medical Officer in Charge of the Typhus Control Unit of the United States Public Health Service, originally suggested this approach to typhus control. Dr. Lewis C. Robbins, Director of the San Antonio Health Department, appreciated the experimental nature of the program and wisely integrated it with other health activities. Major Warren H. Booker, sanitary engineer of the health department, supervised the general aspects of the work. Dr. E. R. Rickard of the Rockefeller Foundation, by his careful epidemiological studies, filled a big gap in the program. The program benefited from the advice of the Typhus Advisory Committee, with Col. Charles F. Craig as chairman, which held monthly meetings to follow the progress.

Special appreciation is due to Mr. Gordon Dexter, area supervisor of malaria control, and to his foreman, Mr. Price, for conscientious administration of the 10-man crew of inspectors. The success of the program depended upon their careful work. Mr. Robert H. Salley painstakingly bled and combed the rats used in this study.

SUMMARY

To determine the value of reducing rat fleas for the control of typhus fever, an experiment was conducted in San Antonio. The southwestern part of the city was dusted with DDT and the rest of the city was untreated.

A crew of 10 men in house to house inspections placed 10-percent DDT in every place rats frequented. A total of 26,832 premises were inspected between April 4 and August 31, 1945. Forty-eight premises were worked per man-day, with an average of ¼ pound of DDT and an operational cost of 25 cents per each of the premises.

Rats were trapped and combed before and after the application of DDT. At first, due to the inexperience of the dusting crew, the

drop in flea index was small, but in June and July reductions in flea abundance occurred. The blood from rats caught in the same area in May (before DDT) and in September (after DDT) was tested for complement-fixing antibodies; the prevalence of antibodies in young rats decreased.

The sources of typhus cases reported to the San Antonio Health Department were investigated. The diagnosis and reporting of cases was improved by interviews with physicians and, after July 1945, by the presence of an epidemiologist.

In the experimental area, 20 cases occurred between May 21, 1944, and April 4, 1945, when dusting began. After the program started, 4 cases occurred in treated premises and 10 cases occurred in premises not yet treated.

In the untreated area, 22 cases occurred between May 21, 1944, and May 24, 1945. After that time, 23 cases were traced to the untreated area. Seven of these cases originated in a small untreated slum area similar to the large slum experimental area. In addition, eight cases originated in the northern part of the city.

The reduction of rat fleas by careful and thorough distribution of DDT is an additional method for the control of typhus fever and has given encouraging results in San Antonio. Additional evaluation will determine the extent of its usefulness.

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(*3*) Rumreich, A. S., and Wynn, R. S.: A study of the rodent-ectoparasite population of Jacksonville, Fla., Pub. Health Rep., **60**: 885–905 (1945).

PLAGUE—THE SURVIVAL OF THE INFECTION IN FLEAS OR HIBERNATING GROUND SQUIRRELS

By F. M. Prince, *Associate Entomologist*, and N. E. Wayson, *Medical Director, Plague Investigation Station, United States Public Health Service, San Francisco, California*

Plague recurs from year to year in the same locality among rodents which hibernate for several months of the year. However, the process through which the disease is continued during the periods of hibernation has been a subject of hypothesis and conjecture rather than of controlled observation.

Wu Lien-teh (*1*) states that he is convinced that the tarabagan, a Siberian marmot, harbors the infection in a latent phase during the

winter hibernation of the animal, and that an active phase of the disease occurs with the awakening of the animal in the spring.

It is known that the plague micro-organism can survive in fleas for a period of several weeks, and it has been assumed that the recurrence of the disease in a locality is caused by infected fleas which have lived in the burrows of their rodent hosts throughout the period of hibernation.

An attempt has been made to test these suppositions by an experiment in which natural conditions were approximated under laboratory control.

Six ground squirrels (*Citellus richardsonii*) and six hundred fleas (*Diamanus montanus*) were used. The squirrels were trapped alive in areas of Montana and North Dakota in which plague has not been found by repeated surveys. They were shipped to the laboratory in San Francisco, and each was held in a separate clean glass box for about 2 months before the experiment was begun. The fleas were bred in the laboratory in clean surroundings on a normal meadow mouse (*Microtus*). During the last week of October, each squirrel had become quiescent and was placed in a separate large tin container with 100 fleas and a bedding of sheets of white tissue paper. The containers were covered with gauze of fine mesh and capped with a perforated metal top. These conditions constituted a nest in which the fleas and their droppings could be easily found, and in which the animal was held captive and could be observed. Evidence of the awakening of the animal was present, since animals shredded the paper and the gauze when they awoke from their hibernating sleep. The nest was placed in a refrigerator where the temperature was maintained at 40° F. throughout the experiment, a period of 4 months.

All the squirrels were in a good hibernating sleep within 10 days. When in this condition, they could be lifted from the nest and handled without being awakened, and all were examined after an interval of 2 weeks and again after 2 months to determine their condition.

The squirrels were grouped in three lots of two each, A, B, and C.

Lot A: Two normal squirrels and 100 plague-infected fleas on each squirrel.
Lot B: Two hibernating squirrels, each inoculated with 0.1 cc. of a plague culture suspended in broth, with 100 normal fleas on each squirrel.
Lot C: Two normal squirrels with 100 normal fleas on each squirrel. A control lot.

Lot A.—The 100 fleas placed with each of these squirrels had been infected with plague by feeding on white mice whose tail blood contained 10 to 20 *Pasteurella pestis* per microscopic field of a blood smear and which died with plague within 3 hours after exposure to the fleas. The fleas selected for the test were those in whose droppings the micro-organism was demonstrated by culture on blood plates.

Inspection of these squirrels after the initial 2-week interval showed

that they were in hibernating sleep, and there was no evidence of activity during this period. However, after the 2-month interval, there was evidence that they had awakened, although they were asleep at the time of this second inspection.

At the end of the 4-month period, the squirrels were awake. They were removed from the nest and both they and their nests were carefully searched for fleas. Fourteen fleas in all were found alive, and many flea droppings were found on the paper nests. The squirrels were kept in clean glass boxes for 15 days to see whether they would develop plague. Each flea was kept in a clean test tube at room temperature and each was given several opportunities to feed on a white mouse during a period of 10 days. However, three fleas failed to feed, and eight died within the 10 days. The droppings of each flea were collected during this period and were cultured on blood agar. As the fleas died, they were triturated in saline, and each was injected subcutaneously into a white mouse.

One flea which had failed to feed before its death (on the third day after removal from the nest) produced droppings containing *P. pestis*, and a suspension of the flea introduced into a white mouse produced acute plague.

No other fleas produced findings of infection either by biting mice, in their droppings, or by being injected into mice.

The squirrels remained well and exhibited no pathology at necropsy.

Lot B.—The two hibernating squirrels of this lot were each inoculated with 0.1 cc. of a broth suspension of *P. pestis* which killed three white mice and three guinea pigs when given subcutaneously at the same time in 0.1-cc. dosage. The fleas placed on these squirrels were normal.

Upon inspection 2 weeks later, one of the squirrels was dead of acute plague. Five fleas recovered from this squirrel at this time produced plague in a guinea pig when triturated and injected subcutaneously.

The other squirrel in this lot was asleep, and there was no evidence of activity during this period. This squirrel was examined again after a 2-month interval and was still in hibernation, but showed evidence of activity sometime during this interval. At the end of the 4-month period, this squirrel was awake. It was removed from the container and both the animal and nest were carefully searched for fleas. Twenty-three fleas were found alive and many flea droppings were found on the paper bedding. The squirrel, and the fleas from the squirrel and its nest, were collected, maintained and treated in the same manner as the squirrels and fleas of Lot A. A few of the fleas failed to feed, and about half of the number died within 10 days after removal from the nest and segregation in test tubes.

None of the fleas produced infection by biting white mice, or when

they were injected into white mice, and their droppings did not contain *P. pestis.*

When the squirrel was killed, a slight infiltration and pigmentation of the skin was observed at the site of inoculation but no other pathology was noted.

Lot C.—The normal squirrels and normal fleas of this lot served as a control to determine whether they would survive under the conditions of the experiment.

When the two squirrels were observed after the 2-week interval, both were asleep. One, however, had shredded the tissue paper, an indication of some activity during this period.

After a 2-month interval, both squirrels showed signs of previous activity, but were in a hibernating sleep at the time of examination.

At the end of the 4-month period when the squirrels were removed from their nest, one was in hibernation and one was awake. A careful search of the squirrels and of their nests was made, and 100 fleas were recovered alive. Immediately after the nests were removed from the refrigerator, these fleas began copulation. They were placed with a normal squirrel in a clean glass box at room temperature and 5 or 6 weeks later a new crop of fleas had developed.

DISCUSSION

It is evident from these experiments that a flea will remain alive and infected with plague in a virulent form for a period of 4 months in the nest of a hibernating squirrel. Also, a large percentage of both normal and infected fleas die within this period. Most of the fleas which were infected and remained alive did not retain the infection for the entire 4 months.

The death, or complete recovery, of the squirrels which were inoculated with plague after their hibernation had become well developed, does not afford a criterion for the opinion that the infection is carried through hibernation in a latent phase and becomes active upon the awakening of the animal. Normal fleas became infected when placed with the squirrel which later died of plague after inoculation with 0.1 cc. of a broth suspension of *P. pestis.* This fact, and the number of flea droppings in each of the six nests, suggest that the fleas fed either during the hibernation of the squirrel or during its periods of transitory activity. However, a large number of all the fleas died during the entire period, and a much larger number died among those which were originally infected or which were probably infected from the squirrel which later died of plague than among those which were not infected. An explanation of the greater mortality among the infected fleas may be that they were unable to feed after having become blocked by the growth of the micro-organism within them.

The process by which plague is carried over the hibernating period of rodents has not been established by this experiment, but enough suggestive evidence has been obtained to merit its repetition, and this is now in progress.

SUMMARY

Six hibernating ground squirrels were stored for 4 months at 40° F. in separate nests.

Two squirrels were inoculated with plague, and each seeded with 100 normal fleas. One squirrel died of plague, and one recovered. Twenty-three fleas of this lot were recovered alive at the end of 4 months and contained no plague germs.

Two squirrels were each seeded with 100 infected fleas. One of the fourteen live fleas recovered from them retained *P. pestis* in a virulent form and produced plague when injected into a white mouse. The squirrels did not become infected.

Two squirrels were seeded with 100 normal fleas each. Fifty percent of the fleas were recovered and were able to reproduce.

REFERENCE

(*1*) Wu Lien-teh; J. W. H. Chun; R. Pollitzer; and C. Y. Wu· Plague. A Manual for Medical and Public Health Workers. National Quarantine Service, 1936, Shanghai, China.

GUIDE TO HEALTH ORGANIZATION IN THE UNITED STATES

A REVIEW

Many persons, including students and new entrants into public health work throughout the United States and visitors from abroad, find considerable difficulty when tracing particular health services to individuals through the complex social and political fabric of our democratic society. The relationships and interrelationships of the numerous agencies of Federal, State, and local government, of voluntary health organizations, and of private professional groups in the field of health are often puzzling, to say the least. In an effort to make the intricacies of health organization in this country understandable both to technically informed health workers and to the general public, the United States Public Health Service has recently published a simple, concise guide on the subject. This Guide to Health Organization in the United States [1] is a useful reference as source material; being in pamphlet form, it is suitable for popular distribution.

[1] Guide to Health Organization in the United States By Joseph W. Mountin and Evelyn Flook. Miscellaneous Publication No 35, United States Public Health Service, Washington, Government Printing Office (1946). Price 20 cents

Following a foreword by Dr. Thomas Parran, Surgeon General of the United States Public Health Service, the authors preview graphically the subject matter treated more fully in the text. They liken the total organizational structure for improvement of health in the United States to a building of several floors, each floor representing one level of government.

Agencies of each governmental level—Federal, State, and local—officially responsible for any type of health activity are identified, and their outstanding health functions and methods of administration are briefly discussed. Contributions to the total health organization by voluntary health agencies and institutions and by private physicians, dentists, and nurses are also described. Although functions of Federal, State, and local official and voluntary agencies are treated in separate sections, the cooperative arrangements between the several governmental areas are emphasized. Operation of direct services by local health agencies, with assistance in the form of financial aid, loan of personnel, performance of technical services, advice, or supervision by State and Federal agencies, is featured.

Although an exhaustive analysis of the complete pattern of health organization is not the purpose of the guide, sufficient detail is presented throughout to show that at the Federal, State, and local plane there is one main health authority, with a surprisingly large number of other agencies charged with one or more contributory or independent health activities. For the most part, direct Federal health service is restricted to selected groups of beneficiaries. Services designed for the community as a whole are usually channelled to the recipient through State and local governmental agencies. State health services, on the other hand, encompass regulatory functions, advice, supervision, promotional activities, financial aid, and in some instances even direct service. Primary responsibility for safeguarding community health rests with the local authority. To simplify discussion, health functions are classified as public health and preventive services, medical and custodial care, professional licensure, and professional education.

The wide diversity in local health service organization for the most part reflects the general diversity in local government. Since local governmental units differ markedly in their financial resources as well as in their legal authority to provide public service, they differ also in the kind of health organization that can be maintained. Regional differences in the development of organized local health service and in the content of local health programs are illustrated in the material presented.

The entire body of information is summarized in terms of health services received by a typical family, either directly or indirectly, through designated agencies of local, State, or Federal government, as well as from voluntary agencies or private professional personnel. The value of this pamphlet is enhanced by the inclusion of significant tabular material in the text and appendices and by an extensive bibliography, provided for those whose interest or purpose leads them beyond the basic facts to which the publication is purposely restricted.

YELLOW FEVER QUARANTINE REQUIREMENTS IN TANGANYIKA TERRITORY

The Department of State has forwarded to the United States Public Health Service a copy of an amendment to the Yellow Fever Ordinance, 1942, of the Tanganyika Territory, Africa. Pertinent portions of this amendment are presented below for the guidance of persons preparing to travel to Tanganyika Territory, and of physicians consulted by such persons.

1. This Ordinance may be cited as the Yellow Fever (Amendment) Ordinance, 1946.

2. Section 2 of the Yellow Fever Ordinance, 1942 (in this Ordinance referred to as the principal Ordinance), is hereby amended by substituting for the definition of "unimmunized person" which occurs therein the following definition:—"unimmunized person" means a suspected person who is unable to satisfy the authority that—

(a) he is immune from yellow fever by reason of a previous attack of the disease; or

(b) he was vaccinated more than ten days (or other prescribed period) and less than four years (or other prescribed period) before he last left an endemic or infected area; or

(c) he was re-vaccinated less than four years (or other prescribed period) before he last left an endemic or infected area and within four years (or other prescribed period) of his previous vaccination.

3. Sub-section (1) of section 4 of the principal Ordinance is hereby repealed and the following sub-section is substituted therefor:—

(1) Every person who enters the Territory within a period of six days (or other prescribed period) from the date when he last left an endemic area shall report in person to the nearest authority without delay.

4. Section 5 of the principal Ordinance is hereby repealed and the following section is substituted therefor:—

5.—(1) Every unimmunized person within an infected area shall, if the authority so requires, submit himself to medical observation or medical surveillance.

(2) Every unimmunized person may be kept under medical observation or medical surveillance until a period of six days (or other prescribed period) has elapsed since the date when he last left an endemic or infected area:

Provided that where such person was vaccinated less than ten days (or other prescribed period) before he last left any such area he may be kept under such observation or surveillance for a period not exceeding ten days (or other prescribed period) from the date of such vaccination.

EXAMINATION FOR POSITIONS AS FOOD AND DRUG INSPECTOR

The Civil Service Commission has announced an examination for filling Food and Drug Inspector positions at salaries ranging from $2,644 to $4,149 a year. Complete instructions on how to apply for the examinations are given in the examination announcement. Information and application forms may be obtained from most first- and second-class post offices, from Civil Service regional offices, or from the U. S. Civil Service Commission, Washington 25, D. C. Applications must be filed with the appropriate district office not later than April 8, 1947.

DEATHS DURING WEEK ENDED MAR. 1, 1947

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Mar. 1, 1947	Corresponding week, 1946
Data for 93 large cities of the United States:		
Total deaths	10,165	10,390
Median for 3 prior years	9,866	
Total deaths, first 9 weeks of year	89,943	94,394
Deaths under 1 year of age	796	626
Median for 3 prior years	626	
Deaths under 1 year of age, first 9 weeks of year	7,377	5,480
Data from industrial insurance companies:		
Policies in force	67,327,235	67,181,267
Number of death claims	14,003	15,894
Death claims per 1,000 policies in force, annual rate	10.8	12.3
Death claims per 1,000 policies, first 9 weeks of year, annual rate	9.8	11.3

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED MARCH 8, 1947

Summary

Sharp increases in the incidence of influenza were reported for the week in certain States of the North Central and West South Central areas and in West Virginia and Colorado. A total of 21,991 cases was reported, as compared with 7,974 last week and a 5-year (1942–46) median of 4,744. Of the net increase of 14,017 over last week's figures, nearly 8,000 occurred in Texas. Of the current total, 21,144 cases, or 96 percent, occurred in the 13 States reporting more than 125 cases, as follows (last week's figures in parentheses): Indiana 526 (137), Iowa 205 (0), Missouri 239 (90), Kansas 3,395 (325), Virginia 520 (491), West Virginia 304 (52), South Carolina 504 (628), Georgia 650 (454), Alabama 233 (130), Arkansas 952 (376), Oklahoma 272 (62), Texas 11,624 (3,636), and Colorado 1,720 (1,212). Only 2 other States reported more than 86 cases—Montana 120 (last week 20) and Idaho 125 (last week 10). The total for the year to date is 62,582 (more than one-third of which were reported for the current week), as compared with 165,882 for the corresponding week last year and a 5-year median of 49,557.

Of 40 cases of poliomyelitis reported for the current week, 10 occurred in California. The total to date is 592, as compared with 443 for the same period in 1946 and a 5-year (1942–46) median of 276. Of 9 cases of smallpox for the week, 5 occurred in Kansas. The reported incidence of undulant fever to date is above that for the same period last year—1,007 cases as compared with 639. To date 25,028 cases of whooping cough have been reported, more than for the same period of any other year since 1943, and nearly twice as many cases of tularemia have been reported (417) as for the same period last year (213).

A total of 10,206 deaths was reported for the current week in 93 large cities in the United States, as compared with 10,165 last week, 9,885 for the corresponding week last year, and a 3-year (1944–46) median of 9,583. To date, 100,149 deaths have been reported in these cities, as compared with 104,279 for the same period last year. This recent increase in urban mortality has accompanied increased incidence of respiratory conditions. Also the number of infant deaths in these cities is above last year's figure, no doubt reflecting the recent high birth rates.

Telegraphic morbidity reports from State health officers for the week ended Mar. 8, 1947, and comparison with corresponding week of 1946 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46
	Mar. 8, 1947	Mar. 9, 1946		Mar. 8, 1947	Mar. 9, 1946		Mar. 8, 1947	Mar. 9, 1946		Mar. 8, 1947	Mar. 9, 1946	
NEW ENGLAND												
Maine	3	1	0	------	11	------	223	23	23	0	0	2
New Hampshire	0	0	0	1	------	------	11	------	5	0	0	0
Vermont	0	0	0	25	------	------	267	4	15	0	0	1
Massachusetts	14	6	5	------	------	------	489	484	536	1	4	7
Rhode Island	0	0	0	------	1	17	232	9	38	0	1	1
Connecticut	1	1	0	1	9	3	883	143	307	1	0	4
MIDDLE ATLANTIC												
New York	9	23	19	[1] 3	[1] 2	[1] 9	314	3,677	1,941	7	17	29
New Jersey	3	1	2	7	10	9	342	1,660	1,417	0	6	10
Pennsylvania	11	21	10	4	4	3	572	2,833	1,323	5	16	26
EAST NORTH CENTRAL												
Ohio	13	20	10	5	8	12	927	349	349	3	16	16
Indiana	15	14	5	526	54	12	65	728	222	0	2	7
Illinois	5	18	14	12	9	9	49	1,939	887	6	14	16
Michigan [2]	5	11	5	5	2	6	108	3,383	630	0	4	12
Wisconsin	0	0	1	44	81	44	65	826	826	3	3	3
WEST NORTH CENTRAL												
Minnesota	10	7	5	------	3	1	57	41	45	0	2	2
Iowa	2	4	4	205	------	1	27	47	244	2	0	0
Missouri	2	6	4	239	6	6	7	442	442	1	9	9
North Dakota	3	2	1	2	8	8	1	------	102	1	1	0
South Dakota	2	1	4	------	------	------	15	82	82	0	0	0
Nebraska	0	2	2	82	17	4	10	85	153	2	1	1
Kansas	5	1	5	3,395	4	6	14	912	460	0	0	2
SOUTH ATLANTIC												
Delaware	0	3	0	------	------	------	4	38	22	0	0	0
Maryland [2]	3	17	6	5	8	8	43	320	320	2	3	4
District of Columbia	1	0	0	2	2	2	18	152	72	0	2	2
Virginia	4	7	7	520	467	637	370	531	531	5	3	10
West Virginia	2	5	4	304	16	18	103	94	94	0	3	5
North Carolina	16	11	8	------	------	14	259	323	323	0	6	6
South Carolina	4	7	6	504	830	705	68	463	225	1	3	3
Georgia	2	7	6	650	67	67	262	459	320	0	3	3
Florida	11	3	1	32	11	10	12	89	89	2	2	3
EAST SOUTH CENTRAL												
Kentucky	5	9	4	4	88	20	4	739	95	0	9	9
Tennessee	10	4	7	70	47	123	112	246	246	0	3	11
Alabama	7	5	6	233	244	229	61	175	132	2	1	6
Mississippi [2]	6	12	9	------	------	------	------	------	------	2	6	6
WEST SOUTH CENTRAL												
Arkansas	2	1	6	952	128	128	176	128	128	2	6	4
Louisiana	9	5	4	18	152	27	59	286	206	0	6	6
Oklahoma	8	3	3	272	99	99	3	113	102	3	1	3
Texas	19	48	48	11,624	2,830	1,689	251	1,541	1,541	10	19	19
MOUNTAIN												
Montana	0	1	0	120	28	14	212	23	80	0	0	1
Idaho	0	1	1	125	40	2	5	36	85	0	0	0
Wyoming	1	0	0	33	1	14	24	35	35	0	0	0
Colorado	5	4	6	1,720	35	40	77	331	331	0	0	0
New Mexico	0	1	1	5	1	2	55	10	13	0	0	0
Arizona	1	4	0	86	122	123	33	70	70	0	1	1
Utah [2]	0	0	0	34	5	29	8	545	178	0	2	1
Nevada	0	0	0	------	------	------	3	1	9	0	0	0
PACIFIC												
Washington	9	8	3	77	------	4	35	881	253	4	3	6
Oregon	1	3	3	24	18	18	18	296	97	0	1	3
California	19	18	19	21	64	86	203	2,848	1,598	7	23	23
Total	248	325	265	21,991	5,532	4,744	7,156	28,440	21,511	72	202	284
10 weeks	2,972	3,898	3,160	62,582	165,882	49,557	48,981	122,429	136,091	834	2,047	2,548
Seasonal low week [3]	(27th) July 5–11			(30th) July 28–Aug. 1			(35th) Aug. 30–Sept. 5			(37th) Sept. 13–19		
Total since low	10,538	15,542	12,023	95,557	528,130	85,419	71,868	148,553	174,456	1,806	3,551	5,000

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Dates between which the approximate low week ends. The specific date will vary from year to year.

Telegraphic morbidity reports from State health officers for the week ended Mar. 8, 1947, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever [4]		
	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46
	Mar. 8, 1947	Mar. 9, 1946		Mar. 8, 1947	Mar. 9, 1946		Mar. 8, 1947	Mar. 9, 1946		Mar. 8, 1947	Mar. 9, 1946	
NEW ENGLAND												
Maine	0	0	0	33	51	30	0	0	0	0	0	0
New Hampshire	0	0	0	3	3	9	0	0	0	0	0	0
Vermont	0	1	0	6	13	12	0	0	0	0	0	0
Massachusetts	0	2	1	119	219	381	0	0	0	3	3	1
Rhode Island	0	0	0	12	9	18	0	0	0	0	0	0
Connecticut	0	1	0	45	43	81	0	0	0	0	0	1
MIDDLE ATLANTIC												
New York	4	0	1	371	594	581	0	0	0	0	4	4
New Jersey	0	0	0	134	121	171	0	0	0	1	2	0
Pennsylvania	1	1	1	224	468	637	0	0	0	1	8	7
EAST NORTH CENTRAL												
Ohio	0	1	2	447	490	442	0	1	0	0	0	2
Indiana	0	2	0	160	129	129	0	1	1	4	0	1
Illinois	1	1	1	179	265	289	1	0	0	3	1	1
Michigan [2]	0	0	0	122	197	276	0	0	0	1	1	1
Wisconsin	2	0	0	95	173	319	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	0	0	0	79	58	110	0	0	0	0	2	0
Iowa	0	0	0	77	57	67	0	0	0	0	0	1
Missouri	0	0	0	29	75	113	1	0	0	1	1	1
North Dakota	0	0	0	8	11	26	0	0	0	0	0	0
South Dakota	0	0	0	15	17	22	0	0	0	0	0	0
Nebraska	0	0	0	25	39	40	0	0	0	0	1	0
Kansas	1	1	1	76	90	101	5	0	0	0	0	0
SOUTH ATLANTIC												
Delaware	0	0	0	12	11	12	0	0	0	1	0	0
Maryland [2]	0	0	0	39	129	129	0	0	0	0	0	0
District of Columbia	0	0	0	9	36	36	0	0	0	0	1	0
Virginia	0	0	0	38	77	77	0	0	0	1	2	1
West Virginia	0	1	0	6	33	48	0	0	0	0	0	0
North Carolina	2	0	0	46	50	43	0	0	0	2	0	0
South Carolina	0	0	0	5	9	9	0	0	0	2	6	1
Georgia	0	0	0	17	16	22	1	0	0	2	3	2
Florida	2	3	0	11	7	7	0	0	0	1	2	2
EAST SOUTH CENTRAL												
Kentucky	1	0	0	56	59	59	0	0	0	3	0	0
Tennessee	0	1	1	55	28	53	0	0	0	0	1	1
Alabama	3	0	0	12	16	16	0	0	0	1	0	1
Mississippi [2]	1	1	0	9	8	15	0	0	0	1	3	2
WEST SOUTH CENTRAL												
Arkansas	2	0	0	6	2	10	1	1	1	0	1	1
Louisiana	4	2	1	4	10	10	0	0	0	1	3	3
Oklahoma	1	1	0	6	24	24	0	0	0	2	0	1
Texas	3	7	4	60	99	76	0	3	1	6	2	2
MOUNTAIN												
Montana	0	2	0	5	9	14	0	0	0	1	0	0
Idaho	0	0	0	9	8	8	0	0	0	0	0	0
Wyoming	0	0	0	13	33	33	0	0	0	0	1	0
Colorado	0	0	0	64	49	49	0	0	0	0	1	1
New Mexico	1	0	0	5	3	9	0	0	0	0	0	0
Arizona	0	0	0	3	18	18	0	0	0	0	0	0
Utah [2]	1	0	0	13	27	64	0	0	0	0	0	0
Nevada	0	0	0	7	0	2	0	0	0	0	0	0
PACIFIC												
Washington	0	1	1	60	38	39	0	0	0	0	0	0
Oregon	0	0	1	34	37	30	0	0	0	0	1	2
California	10	8	3	145	213	213	0	3	0	6	6	1
Total	40	37	29	3,008	4,171	5,036	9	9	12	44	56	53
10 weeks	[5] 592	443	276	26,745	32,501	39,658	40	72	136	[5] 437	423	568
Seasonal low week [3]	(11th) Mar. 15–21			(32nd) Aug. 9–15			(35th) Aug. 30–Sept. 5			(11th) Mar. 15–21		
Total since low	[5] 25,367	13,780	12,342	53,431	71,072	78,754	94	148	253	3,965	4,674	5,707

[2] Period ended earlier than Saturday.
[3] Dates between which the approximate low week ends. The specific date will vary from year to year.
[4] Including paratyphoid fever reported separately, as follows: Massachusetts 3 (salmonella infection); Georgia 2; Kentucky 1; Texas 2; California 2.
[5] Corrected reports: Poliomyelitis, Arkansas, week ended February 22, 2 cases (instead of 1); typhoid fever, North Carolina, week ended February 8, 1 case (instead of 2).

Telegraphic morbidity reports from State health officers for the week ended Mar. 8, 1947, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Whooping cough: Week ended— Mar. 8, 1947	Whooping cough: Week ended— Mar. 9, 1946	Whooping cough: Median 1942–46	Week ended Mar. 8, 1947: Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis, infectious	Rocky Mt. spotted fever	Tularemia	Typhus fever, endemic	Undulant fever
NEW ENGLAND											
Maine	16	12	28								3
New Hampshire	2		1								
Vermont	19	14	34								2
Massachusetts	117	146	146		1						2
Rhode Island	12	46	39								
Connecticut	48	69	67				1				4
MIDDLE ATLANTIC											
New York	196	220	261	5	1		1				2
New Jersey	130	154	154	2							1
Pennsylvania	180	123	141								3
EAST NORTH CENTRAL											
Ohio	162	104	125	1							1
Indiana	42	19	19				2		1		1
Illinois	90	104	104	3	1				3		9
Michigan [2]	232	123	147	1							3
Wisconsin	143	75	75	2							7
WEST NORTH CENTRAL											
Minnesota	12	9	20	2							1
Iowa	26	10	10								16
Missouri	24	6	14			1			2		2
North Dakota			3								
South Dakota			1								
Nebraska	41		8								
Kansas	5	73	49								2
SOUTH ATLANTIC											
Delaware	10	3	2								
Maryland [2]	65	23	41								
District of Columbia	2	4	4								
Virginia	63	35	70			231					1
West Virginia	27	31	31								
North Carolina	93	55	100		1						
South Carolina	27	69	69		3					1	
Georgia	12	7	16	1	4				6	11	1
Florida	54	15	18	1		1				4	1
EAST SOUTH CENTRAL											
Kentucky	39	25	32								
Tennessee	27	36	36	1					4	3	
Alabama	50	11	22						1	1	
Mississippi [2]									2	3	2
WEST SOUTH CENTRAL											
Arkansas	26	6	20	1	2	6			3	2	
Louisiana	4	10	5	13	1		1		1	2	
Oklahoma	5	5	9					3	3		1
Texas	376	219	219	8	215	115			1	10	14
MOUNTAIN											
Montana	8		5								
Idaho	4	12	4								
Wyoming	4	4	4								
Colorado	18	26	26	1							1
New Mexico	9	18	17								
Arizona	25	21	21			14					
Utah [2]	11	26	27	1							3
Nevada	5		1								
PACIFIC											
Washington	39	37	35	1		7					
Oregon	2	9	30								1
California	133	97	277	4	4					1	2
Total	2,635	2,111	2,614	48	233	375	5	3	27	38	86
Same week, 1946	2,111			37	297	81	19	1	24	40	66
Median, 1942–46	2,614			33	287	71	11	0	10	32	[6] 80
10 weeks: 1947	25,028			449	3,461	2,219	67	9	417	460	1,007
1946	18,272			400	2,920	1,099	85	4	213	500	639
Median, 1942–46	23,430			261	2,118	648	85	4	208	500	[6] 747

[2] Period ended earlier than Saturday.

[6] 2-year average, 1945–46.

Leprosy: Kentucky 1 case.

WEEKLY REPORTS FROM CITIES [1]

City reports for week ended Mar. 1, 1947

This table lists the reports from 90 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0	1	0	------	0	0	0	2	0	0	9
New Hampshire:												
Concord	0	0	------	0	------	0	2	0	0	0	0	------
Vermont:												
Barre	0	0	------	0	24	0	0	0	0	0	0	1
Massachusetts:												
Boston	9	0	------	0	41	2	12	0	27	0	0	22
Fall River	0	0	------	0	8	0	1	0	4	0	0	4
Springfield	1	0	------	0	2	0	0	0	3	0	0	2
Worcester	0	0	------	0	------	0	5	0	7	0	0	15
Rhode Island:												
Providence	0	1	------	0	131	0	4	0	7	0	0	11
Connecticut:												
Bridgeport	0	0	------	0	21	0	0	0	4	0	0	------
Hartford	0	0	------	0	22	0	2	1	2	0	1	1
New Haven	0	0	------	0	31	0	3	0	13	0	0	13
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0	------	1	------	1	4	0	8	0	0	5
New York	12	1	7	2	132	4	72	0	139	0	0	41
Rochester	0	0	------	0	3	1	1	0	21	0	0	3
Syracuse	0	0	------	0	------	0	2	0	11	0	0	14
New Jersey:												
Camden	7	0	------	0	------	0	2	0	1	0	0	2
Newark	0	0	1	0	4	1	3	0	9	0	0	29
Trenton	0	0	1	0	26	1	3	0	11	0	1	------
Pennsylvania:												
Philadelphia	1	0	4	1	19	1	17	0	42	0	0	32
Pittsburgh	1	0	------	0	98	2	10	0	21	0	0	10
Reading	1	0	------	0	6	0	0	0	7	0	3	2
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	0	0	1	2	------	0	5	0	6	0	0	8
Cleveland	3	0	1	2	387	3	9	0	40	0	0	17
Columbus	2	0	------	0	1	0	3	0	11	0	0	5
Indiana:												
Fort Wayne	0	0	------	0	13	0	4	0	3	0	0	------
Indianapolis	1	1	------	1	4	0	8	0	15	0	0	34
South Bend	0	0	------	0	3	0	0	0	6	0	0	------
Terre Haute	0	0	------	0	------	0	1	0	5	0	0	------
Illinois:												
Chicago	0	0	1	0	24	4	31	1	55	0	0	40
Springfield	1	0	------	0	1	0	5	0	4	0	0	------
Michigan:												
Detroit	3	2	------	0	2	4	21	0	72	0	1	109
Flint	0	0	------	0	------	0	3	0	3	0	0	9
Grand Rapids	0	0	------	0	3	0	2	0	4	0	0	6
Wisconsin:												
Kenosha	0	0	------	0	------	0	0	0	0	0	0	------
Milwaukee	0	0	------	0	10	1	9	0	8	0	0	52
Racine	0	0	------	0	------	0	1	0	1	0	0	4
Superior	0	0	------	0	------	0	1	0	4	0	0	2
WEST NORTH CENTRAL												
Minnesota:												
Duluth	1	0	------	0	1	0	2	0	4	0	0	3
Minneapolis	5	0	------	0	3	0	7	0	9	0	0	6
St. Paul	1	0	------	0	2	2	3	0	19	0	0	9
Missouri:												
Kansas City	0	0	------	0	6	2	9	1	15	0	0	14
St. Joseph	0	0	------	0	------	0	0	0	0	0	0	1
St. Louis	0	0	48	1	1	0	16	0	11	0	0	9

[1] In some instances the figures include nonresident cases.

City reports for week ended Mar. 1, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
Nebraska:												
Omaha	0	0	------	0	------	0	1	0	2	0	0	------
Kansas:												
Topeka	0	0	------	0	1	0	0	0	4	0	0	------
Wichita	0	0	------	0	1	0	4	0	4	0	0	2
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0	------	0	1	0	2	0	3	0	0	4
Maryland:												
Baltimore	6	0	1	1	6	0	10	0	9	0	0	40
Cumberland	0	0	------	0	------	0	2	0	0	0	0	------
Frederick	0	0	------	0	------	0	0	0	1	0	0	------
District of Columbia:												
Washington	0	0	2	0	9	1	9	0	13	0	0	2
Virginia:												
Lynchburg	0	0	------	0	------	0	0	0	0	0	0	1
Richmond	0	0	1	1	82	0	3	0	1	0	0	------
Roanoke	0	0	------	0	1	0	0	0	6	0	0	------
West Virginia:												
Charleston	0	0	------	0	------	0	0	0	0	0	0	------
Wheeling	0	0	------	0	------	0	1	0	3	0	0	1
North Carolina:												
Raleigh	0	0	------	0	1	0	1	0	0	0	0	8
Wilmington	2	0	------	0	12	0	0	0	0	0	0	------
Winston-Salem	0	0	------	0	36	0	0	0	0	0	0	------
South Carolina:												
Charleston	0	0	15	0	1	0	1	0	0	0	0	------
Georgia:												
Atlanta	0	0	91	1	4	0	6	0	2	0	1	0
Brunswick	0	0	------	0	------	0	0	0	0	0	0	2
Savannah	0	0	3	0	53	0	0	0	0	0	0	------
Florida:												
Tampa	1	0	4	0	2	1	2	0	5	0	0	6
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	1	0	4	3	------	0	5	0	5	0	0	7
Nashville	0	0	------	2	------	0	2	0	5	0	0	------
Alabama:												
Birmingham	1	0	8	2	4	1	5	0	0	0	0	------
Mobile	0	0	3	0	5	0	2	0	1	0	0	------
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	------	1	------	0	1	0	0	0	0	------
Louisiana:												
New Orleans	7	0	12	2	23	4	7	4	3	0	4	7
Shreveport	0	0	------	0	------	0	8	0	0	0	0	------
Oklahoma:												
Oklahoma City	0	0	7	0	------	1	4	0	1	0	1	------
Texas:												
Dallas	0	0	------	0	13	0	6	0	1	0	0	5
Galveston	0	0	------	0	------	0	1	0	0	0	0	------
Houston	1	0	------	0	------	0	8	0	2	0	0	5
San Antonio	1	0	------	2	7	0	6	0	5	0	0	------
MOUNTAIN												
Montana:												
Billings	0	0	------	0	------	0	0	0	0	0	0	1
Great Falls	0	0	------	0	133	0	1	0	1	0	0	------
Helena	0	0	------	0	5	0	0	0	2	0	0	1
Missoula	0	0	------	0	1	0	1	0	0	0	0	------
Idaho:												
Boise	0	0	------	0	------	0	3	0	0	0	0	------
Colorado:												
Denver	2	0	34	0	22	0	17	0	27	0	0	1
Pueblo	0	0	------	0	------	0	0	0	1	0	0	------
Utah:												
Salt Lake City	1	0	------	0	5	0	1	0	3	0	0	1

City reports for week ended Mar. 1, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
PACIFIC												
Washington:												
Seattle	0	0		0	1	2	2	0	6	0	0	4
Spokane	0	0	2	1	11	0	3	0	3	0	0	
Tacoma	1	0		0	1	0	0	0	1	0	0	6
California:												
Los Angeles	8	0	2	0	4	1	3	4	27	0	0	7
Sacramento	0	0		0		1	1	0	2	0	0	1
San Francisco	2	0		0	9	3	5	1	10	0	13	3
Total	83	5	254	26	1,483	44	417	12	793	0	25	659
Corresponding week, 1946*	75		149	32	10,167		430		1,120	2	9	525
Average 1942-46*	71		200	[2] 40	[3] 5,164		[2] 470		1,658	1	10	710

[2] 3-year average, 1944-46.
[3] 5-year median, 1942-46.
*Exclusive of Oklahoma City.

Dysentery, amebic.—Cases: New York 1; Chicago 2; Detroit 1; San Francisco 1.
Dysentery, bacillary.—Cases: Worcester 1; Detroit 1.
Dysentery, unspecified.—Cases: San Antonio 1.
Tularemia.—Cases: New Orleans 1.
Typhus fever, endemic.—Cases: Nashville 2; New Orleans 3; Houston 1; Los Angeles 1.

Rates (annual basis) per 100,000 population, by geographic groups, for the 90 cities in the preceding table (latest available estimated population, 34,602,700)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza Case rates	Influenza Death rates	Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
New England	26.1	2.6	2.6	0.0	732	5.2	75.8	2.6	180	0.0	2.6	204
Middle Atlantic	10.2	0.5	6.0	1.9	133	5.1	52.8	0.0	125	0.0	1.9	64
East North Central	6.1	1.8	1.8	3.0	272	7.3	62.6	0.6	144	0.0	0.6	174
West North Central	14.1	0.0	96.5	2.0	30	8.0	84.5	2.0	137	0.0	0.0	88
South Atlantic	14.7	0.0	191.2	4.9	340	3.3	60.5	0.0	70	0.0	1.6	105
East South Central	11.8	0.0	88.5	41.3	53	5.9	82.6	0.0	65	0.0	0.0	41
West South Central	22.9	0.0	48.3	12.7	109	12.7	104.1	10.2	30	0.0	12.7	43
Mountain	23.8	0.0	270.0	0.0	1,318	0.0	182.7	0.0	270	0.0	0.0	32
Pacific	17.4	0.0	6.3	1.6	41	11.1	22.1	7.9	77	0.0	20.6	33
Total	12.5	0.8	38.4	3.9	224	6.6	63.0	1.8	120	0.0	3.8	100

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended February 15, 1947.—During the week ended February 15, 1947, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		21		222	291	18	29	135	124	840
Diphtheria		3	1	24	2	3		4		37
Dysentery, amebic					6					6
German measles				16	42	1		3	8	70
Influenza		23			12	2				37
Measles		112		147	55	306	119	334	409	1,482
Meningitis, meningococcus			2	1					1	4
Mumps		11		34	493	73	284	30	148	1,073
Poliomyelitis		1		6						7
Scarlet fever		5	4	48	87	3	3	3	12	165
Tuberculosis (all forms)		3	7	105	22	7	7	15	56	222
Typhoid and paratyphoid fever		1		7		1		1	1	11
Undulant fever				13	1			3	1	18
Venereal diseases:										
Gonorrhea	3	22	12	108	92	41	38	56	98	470
Syphilis	1	6	10	110	82	17	6	7	47	286
Whooping cough				38	56	39	7	1	21	162

FINLAND

Notifiable diseases—December 1946.—During the month of December 1946, cases of certain notifiable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	10	Paratyphoid fever	282
Diphtheria	1,063	Poliomyelitis	15
Dysentery	10	Scarlet fever	216
Gonorrhea	1,310	Syphilis	418
Lymphogranuloma inguinale	1	Typhoid fever	26
Malaria	2		

NEW ZEALAND

Notifiable diseases—4 weeks ended January 25, 1947.—During the 4 weeks ended January 25, 1947, certain notifiable diseases were reported in New Zealand as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Cerebrospinal meningitis	8	1	Poliomyelitis	3	1
Diphtheria	58	1	Puerperal fever	10	1
Dysentery:			Scarlet fever	56	
Amebic	1		Tetanus	2	
Bacillary	6		Trachoma	1	
Erysipelas	12		Tuberculosis (all forms)	187	53
Food poisoning	1		Typhoid fever	5	1
Malaria	3		Undulant fever	2	
Ophthalmia neonatorum	2				

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From consular reports, international health organizations, medical officers of the Public Health Service, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

[C indicates cases]

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place		January-December 1946	January 1947	February 1947—week ended—			
				1	8	15	22
ASIA							
Afghanistan	C	35					
Burma	C	1,543	2				
Bassein	C	29					
Moulmein	C	204					
Rangoon	C	23					
Ceylon	C	110					
China:							
Anhwei Province	C	2,749					
Chekiang Province	C	4,680					
Formosa, Island of	C	3,432					
Fukien Province	C	1,465					
Foochow	C	712					
Honan Province	C	1,878					
Hopeh Province	C	397					
Hunan Province	C	2,040					
Hupeh Province	C	360					
Ichang Province	C	147					
Kiangsi Province	C	1,594					
Kiangsu Province	C	[1] 9,752					
Shanghai	C	[1] 4,583					
Kwangsi Province	C	956					
Kwangtung Province	C	4,845					
Canton	C	2,002					
Hong Kong	C	505					
Kweichow Province	C	8					
Macao, Island of	C	2					
Shantung Province	C	225					
Szechwan Province	C	162					
Yunnan Province	C	17					
India	C	72,740	2,701				
Bombay	C	[2] 2					
Calcutta	C	1,925	118	63	54	61	
Cawnpore	C	45					
Chittagong	C	8					
Madras	C	5					
India (French)	C	4	30				
Indochina (French):							
Cambodia	C	508	230				
Cochinchina	C	911	48				
Bien Hoa	C	24					
Chaudok	C	21					
Mytho	C	144					
Rachgia	C	1					
Saigon-Cholon	C	88	15	2	1	6	
Vinh-long	C	16	4				
Laos	C	49					
Japan	C	1,229					
Korea (Chosen)	C	[3] 11,351					
Malay States	C	245					
Manchuria	C	18,554					
Mongolia	C	16					
Siam (Thailand)	C	4,379	527	135	166		
Bangkok	C	534	175	30	15		
Straits settlements: Singapore	C	[2] 1					

[1] Includes imported cases.
[2] Imported.
[3] From the beginning of the outbreak in April or May to approximately Sept. 1, 1946.

PLAGUE

[C indicates cases; D, deaths; P, present]

Place		January-December 1946	January 1947	February 1947—week ended— 1	8	15	22
AFRICA							
Algeria	C	2					
Bechuanaland	C	21					
Belgian Congo	C	[1] 35					
British East Africa:							
Kenya	C	38		1			
Uganda	C	12					
Egypt	C	217					
Alexandria	C	126					
Ismailiya	C	27					
Matariya	C	12					
Port Said	C	19					
Suez	C	32					
Libya: Tripolitania—Plague-infected rats		1					
Madagascar	C	282	33	1			
Union of South Africa	C	7	1	8			
ASIA							
Burma	C	1,703	380	103	125		
Bassein	C	23	[2] 1				
Mandalay	C	1	7				
Rangoon	C	154				1	
China:							
Chekiang Province	C	733					
Formosa, Island of	C	11					
Fukien Province	C	4,392					
Amoy	C	307					
Foochow	C	1,403					
Kiangsi Province	C	285					
Kwangtung Province	C	415					
Yunnan Province	C	352					
India	C	21,705	10,065				
Indochina (French):							
Annam	C	4	3				
Cochinchina	C	48		1			
Java	D	[3] 2,409					
Manchuria	C	[4] 316					
Palestine	C	17	1				
Siam (Thailand)	C	41	8	1	3		
EUROPE							
Great Britain: Malta, Island of	C	6					
Portugal: Azores	C	[5] 23	1				
NORTH AMERICA							
Canada.[6]							
SOUTH AMERICA							
Argentina:							
Buenos Aires	C	8					
Cordoba Province	C	1					
Bolivia:							
Chuquisaca Department	C	1					
Santa Cruz Department	C	12					
Tarija Department—Plague-infected rats		P					
Brazil:							
Alagoas State	C	2					
Bahia State	C	33					
Ceara State	C	125					
Minas Geraes State	C	12					
Parahyba State	C	18					
Pernambuco State	C	35					
Sergipe State	C	1					
Ecuador:							
Chimborazo Province	C	7	1				
Loja Province	C	38					

See footnotes at end of table.

PLAGUE—Continued

Place		January-December 1946	January 1947	February 1947—week ended— 1	8	15	22
SOUTH AMERICA—continued							
Peru:							
Lambayeque Department	C	15					
Libertad Department	C	8					
Lima Department	C	29					
Piura Department	C	63					
Tumbes Department	C	1					
Plague-infected rats		P					
Venezuela	C	1					
OCEANIA							
Hawaii Territory: [7] Plague-infected rats		7					

[1] Includes 16 cases of pneumonic plague.
[2] Imported.
[3] Unofficially reported.
[4] Includes 52 cases of pneumonic plague.
[5] Includes 2 cases of pneumonic plague.
[6] The imported suspected case previously reported has not been confirmed. Under date of Sept. 14, 1946, plague infection was reported in a pool of fleas from squirrels in Alsask and in a pool of fleas from squirrels in Superb, Saskatchewan, Canada.
[7] Plague infection was also proved in Hawaii Territory as follows: On Feb. 5, 1946, in a pool of 29 rats; on Apr. 13, 1946, in a pool of 54 fleas and 15 lice recovered from 7 rats and 22 mice; under date of July 3, 1946, in a pool of 50 fleas recovered from 7 rats and 46 mice, and in a pool of 51 fleas recovered from 10 rats; under date of July 17, 1946, in a pool of 48 fleas recovered from 22 rats, and in a pool of 56 fleas recovered from 33 rats; under date of Sept. 12, 1946, in a pool of 48 fleas recovered from 22 rodents; under date of Oct. 9, 1946, in a pool of 36 rats found on Sept. 10, 1946; on Jan. 9, 1947, in a pool of 31 rats.

SMALLPOX

[C indicates cases; P, present]

Place		January-December 1946	January 1947	February 1947—week ended— 1	8	15	22
AFRICA							
Algeria	C	393	44				
Angola	C	184					
Basutoland	C	46					
Bechuanaland	C	14					
Belgian Congo	C	[1] 3,483	[1] 64	[1] 11	[1] 40		
British East Africa:							
Kenya	C	893	27	11	12		
Nyasaland	C	745	76	19	31	31	
Tanganyika	C	6,760	50				
Uganda	C	574	30	6			
Cameroon (French)	C	96	1				
Dahomey	C	1,591	12				
Egypt	C	405	17	2			
Eritrea	C	[1] 23					
French Equatorial Africa	C	163					
French Guinea	C	935	1				
French West Africa: Dakar District	C	40					
Gambia	C	7					
Gold Coast	C	1,552	170	40			
Ivory Coast	C	1,651	190				
Liberia	C	237	11				
Libya	C	923	266	72	60		
Madagascar	C	1					
Mauritania	C	1	17				
Morocco (French)	C	1,890	24		[2] 6		
Morocco (Int. Zone)	C	178					
Morocco (Spanish)	C	5					
Mozambique	C	4					
Nigeria	C	6,157					
Niger Territory	C	563	91				
Rhodesia:							
Northern	C	436	2				
Southern	C	148	1	1			
Senegal	C	95	4				
Sierra Leone	C	500					
Somaliland (Italian)	C	1					
Sudan (Anglo-Egyptian)	C	56	[1] 10	[1] 2		[1] 4	
Sudan (French)	C	2,041	87				
Swaziland	C	4	9				
Togo (French)	C	361	45				
Tunisia	C	376					
Union of South Africa	C	675	P		P	P	

See footnotes at end of table.

SMALLPOX—Continued

Place		January-December 1946	January 1947	February 1947—week ended—			
				1	8	15	22
ASIA							
Arabia	C	4					
Burma	C	1,981	223	83	106		
Ceylon	C	546	1				
China	C	2,687	354	58	47	39	
India	C	60,453	3,217				
India (French)	C	3					
India (Portuguese)	C	19	1				
Indochina (French)	C	2,377	373				
Iran	C	34	2				
Iraq	C	22					
Japan	C	17,800	67		5		
Malay States	C	2,973	810	310			
Manchuria	C	2					
Palestine	C	[3] 2					
Rhodes, Island of	C	[3] 1					
Siam (Thailand)	C	17,775	251	51	64		
Straits Settlements	C	204	44	14	5	9	
Syria and Lebanon	C	9					
Turkey (see Turkey in Europe).							
EUROPE							
Czechoslovakia	C	24					
France	C	16					
Germany	C	1					
Gibraltar	C	[3] 3					
Great Britain:							
England and Wales	C	[4] 53			8		
Malta, Island of	C	10					
Scotland	C	2					
Greece	C	114					
Italy	C	654					
Portugal	C	58	2	1			
Spain	C	9	11				
Turkey	C	17					
Yugoslavia	C	1					
NORTH AMERICA							
Canada	C	2					
Guatemala	C	56					
Honduras	C	4					
Mexico	C	397					
Nicaragua	C	3					
SOUTH AMERICA							
Argentina	C	69					
Bolivia	C	918					
Brazil	C	[1] 518	[1] 13	[1] 2		[1] 2	
Colombia	C	1,071	159				
Ecuador	C	120	19				
Paraguay	C	397	[1] 82				
Peru	C	536					
Uruguay	C	52					
Venezuela	C	[1] 1,771	[1] 66				[1] 138
OCEANIA							
Hawaii Territory	C	[5] 1					

[1] Includes alastrim.
[2] For the period Feb. 1-10, 1947.
[3] Imported.
[4] Includes imported cases.
[5] Off-shipping.

TYPHUS FEVER*

[C indicates cases; P, present]

Place		January-December 1946	January 1947	February 1947—week ended— 1	8	15	22
AFRICA							
Algeria	C	843	15				
Basutoland	C	11	1				
Belgian Congo [1]	C	2,570	27	8	7		
British East Africa:							
Kenya	C	26	1				
Uganda	C	1	1				
Egypt	C	1,525	13	1			
Eritrea	C	1,407	104	30	18		
French West Africa: Dakar District	C	7					
Gold Coast	C	1					
Libya	C	88	1				
Madagascar [2]	C	1					
Morocco (French)	C	3,786	39				
Morocco (Int. Zone)	C	59					
Morocco (Spanish)	C	27					
Nigeria	C	34					
Rhodesia, Northern	C	2					
Sierra Leone [1]	C	6					
Tunisia [1]	C	280					
Union of South Africa [1]	C	542	P	P	P	P	
ASIA							
Arabia [2]	C	2					
Burma [1]	C	4	2				
China [1]	C	395	2	2			
India	C	303					
Indochina (French)	C	70					
Iran	C	151	3				
Iraq	C	219	13	3	3		
Japan	C	31,141	240		48		
Malay States	C	3					
Manchuria	C	90					
Palestine [1]	C	121					
Philippine Islands [1]	C	4					
Straits Settlements	C	3	1				
Syria and Lebanon	C	86	1				
Trans-Jordan	C	21					
Turkey. (See Turkey in Europe.)							
EUROPE							
Albania	C	140					
Austria	C	35		1			
Belgium [1]	C	14					
Bulgaria	C	1,120	149				
Czechoslovakia [1]	C	799	2				
France [1]	C	16	3				
Germany	C	1,873	3	1			
Gibraltar [2]	C	1					
Great Britain:							
England and Wales	C	1					
Malta and Gozo [1]	C	32			1		
Greece [1]	C	631	25	5	3	8	
Hungary	C	1,115	80	26	24		
Italy	C	29		1			
Netherlands [1]	C	29					
Poland	C	3,430	65				
Portugal	C	14	1				
Rumania	C	8,735	1,448	337			
Spain	C	28	2				
Canary Islands	C	2					
Sweden [2]	C	1					
Switzerland [1]	C	2	1				
Turkey	C	1,412	101	21	42	24	
Union of Soviet Socialist Republics: Ukraine	C	P					
Yugoslavia	C	3,040					

See footnotes at end of table.

TYPHUS FEVER—Continued

Place		January-December 1946	January 1947	February 1947—week ended—			
				1	8	15	22
NORTH AMERICA							
Costa Rica [2]	C	123	9	2	1		3
Cuba [2]	C	18					
Guatemala	C	779					
Jamaica [2]	C	41			1		
Mexico	C	1,928					
Nicaragua [2]	C	1					
Panama Canal Zone	C	1					
Panama (Republic)	C	4	1				
Puerto Rico [2]	C	105	3	1	2		
Salvador	C	1					
Virgin Islands [2]	C	3					
SOUTH AMERICA							
Argentina	C	7					
Bolivia	C	254					
Brazil [1]	C	17					
Chile	C	561					
Colombia	C	973	127				
Curacao [2]	C	1					
Ecuador [1]	C	1,096	46				
Paraguay	C	7					
Peru	C	1,123					
Venezuela [1]	C	112	5				
OCEANIA							
Australia [2]	C	153	6				
Hawaii Territory [2]	C	89	5	1		2	

Reports from some areas are probably murine type, while others probably include both murine and louse-borne types.

[1] Includes cases of murine type.
[2] Murine type.

YELLOW FEVER

[C indicates cases, D, deaths]

AFRICA							
French Equatorial Africa: Carnot	C	[1] 8					
Ivory Coast: Seguela	C	1					
Nigeria:							
Ibadan	C	1					
Ilorin	C	1					
Kafanchan	C	2					
Ogbomosho	C	41					
Sierra Leone: Pujehan	C	1					
SOUTH AMERICA							
Bolivia: Santa Cruz Department	D	[2] 40					
Brazil: Para State	D	1					
Colombia:							
Antioquia Department	D	1					
Caldas Department	D						1
Caqueta Territory	D	2					
Cundinamarca Department	D		1				
Magdalena Department	D	1					
Santander Department	D	17	9			3	
Tolima Department	D		1				
Peru: San Martin Department	D	3					
Venezuela:							
Tachira State	C	4					
Trujillo State	C	4					
Zulia State	C	4					

[1] Includes 3 suspected cases.
[2] Diagnosis confirmed in 14 cases and 10 deaths.

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

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EDITORIAL

CREATING UNIFORM PROCEDURES

On occasion, official agencies are criticized for enunciating policies and principles, regulations and standards, in a fashion that would imply omniscience and finality. Unquestionably, such criticism is often valid. Although it is the proper function of government to guide and aid the thought and action of the people, it should never become the practice to deal in arbitrary assertions. To be sure, for the sake of order and efficient administration, public enterprises, whatever their nature, must have clearly defined plans and procedures. It should never be presumed, however, that such patterns of action are of unchanging character. New evidence, diversity of opinion, the experience of reputable minds, should constantly be sought out. Eventually through change and interchange, through criticism and attack, through the accumulation of data in all fields, interpretations, and ideas, orderly procedures can be developed.

Such is the prestige of official agencies that their pronouncements, even those specified as tentative, are likely to be too readily accepted in certain quarters as final. This can do great harm by impeding initiative and imposing rigidity on thought. It is the responsibility of the Tuberculosis Control Division to preserve freedom of inquiry and to serve as a clearing house of facts and ideas for the whole field of tuberculosis. As an organization of national scope, the Division is a center of information on service and research, and, as such, it perceives, with detailed clarity, that the discrepancy between opinion and fact is greater than is generally assumed. It is the deliberate

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intention of the Division to stimulate study and speculation through its publications so that, out of the forum of free discussion, agreement may be developed and action given organized direction.

Too often in exchanges of information with fellow workers, minority opinion is neglected. In the attempt to arrive at principles and procedures, it is important to publish with appropriate emphasis dissenting opinions and judgments, for it may well be that, in some instances, the direction of the many may take that of the few. In any event, uniform procedures and standards should always be applied cautiously. There is no validity in forcing inflexible uniformity on activities which require, for fruitful endeavor, unlimited freedom in the pursuit of truth. This is particularly true in the field of medical research. However, in order to realize full benefits from available resources, a high degree of uniformity must be achieved in the diagnosis of tuberculosis, the classification of the tuberculous, and the proper disposition of persons with abnormal findings on X-ray films.

There are certain definite steps which policy-making groups should take before nation-wide practices are recommended. All aspects of any given problem should be presented publicly and made freely available for discussion and criticism. Recognized experts, carefully selected and limited in number, should then be brought together to study and evaluate all sides of any question. The agreements, and disagreements as well, of such a group should form the basis of tentative procedures. Continuing review by this group at regular intervals will make for improvement and increase the usefulness of all public health practices.

When these steps have been taken, then it is appropriate to publish recommendations. Finally, the comments and criticisms of the public health workers who will apply such procedures and recommendations should be considered. When the evidence is in, when the minority has had ample opportunity to test its objection, acceptable uniform procedures can be established. In this way, authoritative standards become meaningful.

From time to time, the Tuberculosis Control Division, out of the experience, study, and thought of its professional workers and consultants, will issue guides and aids to public health practice in tuberculosis control. The Division will continue to publish provocative opinions on controversial subjects and will invite criticism and free discussion to clarify our thinking and advance our knowledge.

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TUBERCULOSIS MORTALITY IN THE UNITED STATES AND IN EACH STATE: 1945[1]

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The course of tuberculosis mortality in the United States during the 4 years of the country's participation in the war was more encouraging than was anticipated at the beginning of the war. Despite unfavorable conditions of work and housing in some areas and the loss of a large number of physicians and nurses to the armed services, the tuberculosis death rate for the country not only continued to decline during the war years, but declined almost as rapidly as in the 4 years preceding the country's entrance into the war.

Generally, economic conditions improved throughout the country during the war, with the expansion of industry and more widespread opportunity for employment. In addition, the threat of war led to intensified efforts for the control of tuberculosis on the part of local, State, and national health agencies, both official and voluntary. For the first time, funds were made available to the United States Public Health Service for an all-out attack on the tuberculosis problem, and, through the combined efforts of the Selective Service System, this agency, and local and State health organizations, case-finding by X-ray was carried out on a scale never before realized in this country.

Tuberculosis, however, is a chronic disease, and continued progress toward its ultimate control depends upon continued effort. Today, there are in this country population groups and geographic areas in which the mortality from tuberculosis exceeds that in other groups and other areas by as large an amount as the tuberculosis death rate at the beginning of the century exceeds the present-day rate.

As in the past, so in the present, mortality statistics are the signposts for the tuberculosis control program, directing efforts to the areas where the greatest problem lies. This paper, the third in a series of annual reports,[2] presents data on the number of deaths and death rates for tuberculosis in the United States and in each State for 1945 with comparable data for the earlier war years, 1942–44, and the prewar period, 1939–41.

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[1] From the National Office of Vital Statistics and the Tuberculosis Control Division.

Grateful acknowledgment is made to Nancy J. Brombacher, Tuberculosis Control Division, United States Public Health Service, for her assistance in assembling and analyzing the material used in this paper.

[2] The preceding reports in the series were:

Moriyama, I. M., and Yerushalmy, J.: Tuberculosis Mortality in the United States in 1943. Vital Statistics—Special Reports, vol. 21, No. 2 (1945).

Yerushalmy, J., and Moriyama, I. M.: Tuberculosis mortality in the United States and in each State, 1944. Public Health Reports, 61 : 487–516 (April 5, 1946). (Tuberculosis Control Issue No. 2.)

TUBERCULOSIS MORTALITY IN THE UNITED STATES

Tuberculosis mortality in 1945.—A total of 52,916 deaths from tuberculosis (all forms) was reported in the United States in 1945, which is 3.3 percent less than the number (54,731) recorded in 1944. The death rate for tuberculosis in 1945 was 40.1 per 100,000 population as compared to 41.3 in 1944.

These rates were computed on a *de facto* basis; that is, only the population residing in the continental United States and the deaths occurring in this population were considered. The members of the armed forces overseas and the deaths occurring in this group were not included in the computations. Since the death rate for tuberculosis in the armed forces overseas was relatively low, the procedure of excluding from the computations the overseas population and deaths results in overstating the rates as compared with those in previous years.

Because of the changes which have occurred in the composition of the population in the continental United States, it is not possible at this time to obtain a measure of the risk of death from tuberculosis entirely comparable with that for previous years. However, the *de jure* rate, which includes the deaths and population of the armed forces overseas as well as the deaths and population of the continental United States, serves as a more comparable measure of the risk of mortality from tuberculosis.

Provisional figures indicate that there were 72 deaths [3] from tuberculosis among Army and Navy personnel occurring outside of the continental limits of the United States in 1945, making a total for the year of 52,988 tuberculosis deaths in the population of the United States, both at home and overseas. The *de jure* tuberculosis death rate based on these figures was 38.0 per 100,000 population, as compared with the *de facto* rate of 40.1.

The *de jure* rates for 1943 and 1944 were 41.8 and 39.6. The corresponding *de facto* rates were 42.6 and 41.3. From inspection of the *de jure* rates, it is apparent that the mortality from tuberculosis in the entire population of the United States declined more rapidly than the *de facto* rates would indicate. On a *de jure* basis the tuberculosis death rate for the United States decreased 5.3 percent from 1943 to 1944 and 4.0 percent from 1944 to 1945. The corresponding decreases in the *de facto* rates were 3.1 and 2.9 percent, respectively.

Although, for purposes of comparison, *de jure* rates would be preferable to *de facto* rates, only the latter type, except where otherwise noted, will be discussed. This procedure is followed because mortality and population statistics, classified by age, race, and particularly State

[3] The figures were made available by courtesy of the Surgeons General of the War and Navy Departments.

of residence, are not available in the same detail for the armed forces overseas as they are for the population in the continental United States.

Trend of tuberculosis mortality: 1910–1945.—Since the beginning of the century when mortality statistics were first collected on an annual basis for the death-registration States, the tuberculosis death rate has declined to a fraction of its former value. In 1900 the rate for the death-registration States was 194.4 per 100,000 population. By 1945 it had declined to one-fifth of this figure (40.1).

Table 1 and figure 1 give the death rates for tuberculosis (all forms) by race and sex for the death-registration States for the years 1910 (the first year that data for the two race groups are available for the death-registration States) to 1945. The rates have been plotted on a semilogarithmic rather than on an arithmetic scale to afford a better visualization of the relative rates of decline in the death rates for the several race-sex groups.

TABLE 1.—*Death rates for tuberculosis (all forms), by race and sex: death-registration States, 1910–45*

[Rates per 100,000 population]

Year	Total	White			Nonwhite		
		Total	Male	Female	Total	Male	Female
1945	40.1	32.7	45.1	21.7	102.1	119.7	86.5
1944	41.3	33.7	45.0	23.3	106.2	122.7	91.3
1943	42.6	34.3	44.4	24.7	112.9	126.4	100.0
1942	43.1	34.4	43.3	25.6	118.4	131.4	106.0
1941	44.5	35.4	43.3	27.4	124.2	134.3	114.5
1940	45.8	36.5	44.7	28.2	127.6	138.7	116.9
1939	47.1	37.7	44.7	30.6	129.1	137.3	121.1
1938	49.1	39.1	46.2	31.9	136.8	144.0	129.8
1937	53.8	43.4	50.9	35.8	145.0	155.0	135.2
1936	55.9	45.0	52.2	37.6	151.6	163.9	139.6
1935	55.1	44.9	51.7	37.8	145.1	155.4	135.0
1934	56.7	46.2	52.7	39.6	148.8	156.9	140.8
1933	59.6	48.5	54.3	42.6	157.7	165.6	149.9
1932	62.5	50.2	55.9	44.4	173.5	179.5	167.5
1931	67.8	54.2	60.1	48.2	191.1	197.4	184.9
1930	71.1	57.7	63.4	51.9	192.0	194.3	189.8
1929	75.3	62.4	67.1	57.6	192.0	191.5	192.6
1928	78.3	64.9	69.7	59.9	199.5	199.4	199.6
1927	79.6	66.5	70.7	62.2	208.7	205.4	212.1
1926	85.5	72.0	76.4	67.5	223.8	221.5	226.1
1925	84.8	71.6	75.8	67.2	221.3	215.8	226.7
1924	87.9	74.9	79.3	70.4	218.6	215.0	222.3
1923	91.7	79.5	84.4	74.5	213.1	206.3	220.0
1922	95.3	82.6	87.5	77.4	218.9	216.6	221.2
1921	97.6	84.7	89.1	80.2	239.3	233.7	245.1
1920	113.1	99.5	104.1	94.8	262.4	255.4	269.6
1919	125.6	110.9	121.1	100.4	284.0	275.5	292.7
1918	149.8	134.3	153.2	115.4	346.0	351.0	340.9
1917	143.5	129.6	----	----	332.6	----	----
1916	138.4	125.7	141.3	109.5	322.7	322.3	323.0
1915	140.1	128.5	144.0	112.2	401.1	420.2	380.5
1914	141.7	130.3	146.9	112.9	396.7	417.8	374.0
1913	143.5	132.6	147.7	116.7	386.5	401.9	369.9
1912	145.4	136.0	149.4	121.8	429.0	459.9	394.5
1911	155.1	145.0	157.5	131.9	461.4	484.8	435.2
1910	153.8	145.9	158.2	132.8	445.5	479.3	406.8

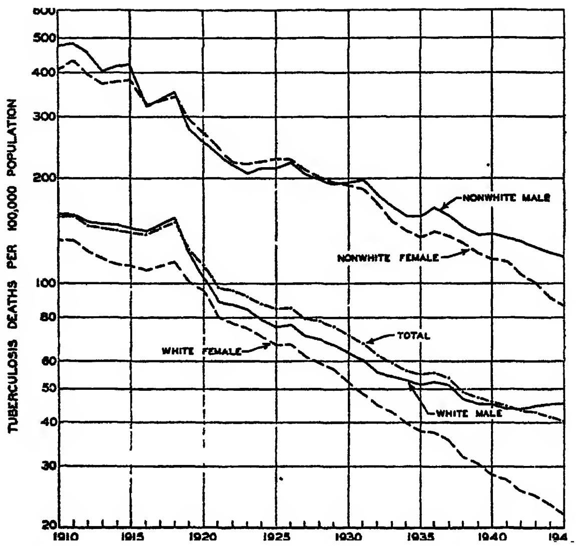

FIGURE 1.—Death rates for tuberculosis (all forms) by race and sex: Death-registration States, 1910–45.

The rates for the total white population declined from 145.9 per 100,000 population in 1910 to 32.7 in 1945. In the same period, the rates for nonwhites declined from 445.5 to 102.1. The percentage decreases for the entire period were approximately the same for the two groups. Since 1922, however, the rates for whites have been declining faster than those for nonwhites.

In both race groups, the rates for females have declined at a faster rate than those for males. The difference is more marked among whites, among whom the rate for females in 1945 was 83.7 percent less than that in 1910, as compared to a decrease of 71.5 percent for males. Among nonwhites the percentage decrease in the rate for females was 78.7 and for males, 75.0.

The decrease in the rate for white males since 1938 has been comparatively small. In fact, a minimum was reached in the years 1941 and 1942, and since then the rate for each year has been higher than in 1938. These increased wartime rates among white males seem to result less from any increase in tuberculosis mortality than from the exclusion of the large healthy population serving in the armed forces overseas. An examination of the *de jure* rates for males of all races lends support to this statement. In 1945 this rate was 47.4 per 100,000 population; 49.0 in 1944; and 50.9 in 1943. The *de facto* rates for these three years were 53.0, 53.1, and 52.9.

Age-specific death rates.—The death rates for tuberculosis by age, race, and sex for 1945 are shown in table 2 and figure 2. The rates for males rise from a minimum in childhood to a peak at the young adult

ages, drop slightly, and then increase to a maximum at the older ages (65–74 for white males and 45–54 for nonwhite males). The peak at the young adult ages has been observed throughout the war years and is more pronounced in 1945 than previously. This peak is only apparent and is due to the use of the *de facto* figures mentioned above. The accentuation of the peak in 1945 results from a decrease in the number of men of military age remaining in the country. The *de jure* rate for males aged 20–29 is 34.5, in comparison to the *de facto* rate which is 64.7.

TABLE 2.—*Death rates and number of deaths for tuberculosis (all forms), by age race, and sex: United States, 1939–41 average, 1942–44 average, 1944, and 1945*

Race, sex, and year	All ages [1]	Age (in years): Under 5	5–9	10–14	15–19	20–24	25–29	30–34	35–44	45–54	55–64	65–74	75 and over
	Tuberculosis deaths per 100,000 population												
All races, both sexes:													
1945	40.1	10.1	2.7	4.5	21.2	49.6	52.7	46.4	49.8	58.1	66.0	73.6	73.6
1944	41.3	12.3	3.1	4.6	22.1	48.4	50.3	48.6	51.6	59.9	69.4	77.2	72.8
1942–44	42.2	12.5	3.5	5.5	23.7	46.8	49.9	50.7	53.1	62.4	70.7	77.9	73.4
1939–41	45.8	15.2	4.4	6.8	27.5	49.2	56.1	56.5	59.0	66.6	74.5	80.4	76.7
Male:													
1945	53.0	10.3	2.7	3.5	17.4	62.0	67.2	53.2	66.0	89.1	101.5	105.9	92.7
1944	53.1	12.7	3.0	3.6	17.4	50.6	56.8	53.7	67.9	91.6	105.4	106.6	92.9
1942–44	52.6	12.9	3.6	4.3	18.5	43.2	50.8	55.8	69.2	93.8	105.3	106.1	90.7
1939–41	53.5	15.5	4.6	5.2	20.0	40.4	51.0	59.8	74.1	95.8	105.8	105.0	88.6
Female:													
1945	28.6	10.0	2.7	5.5	24.5	43.7	44.9	40.7	34.7	27.0	29.5	42.8	57.3
1944	30.5	11.8	3.2	5.6	26.4	47.0	46.0	44.2	36.3	27.9	32.2	49.0	55.4
1942–44	32.3	12.1	3.4	6.7	28.7	49.6	49.3	46.0	37.7	30.5	34.8	50.8	58.4
1939–41	38.0	15.0	4.3	8.5	35.0	57.8	61.0	53.4	43.9	35.9	41.6	56.2	66.3
White, both sexes:													
1945	32.7	7.4	1.8	2.4	11.4	30.8	36.4	33.9	39.3	50.2	61.1	70.6	72.7
1944	33.7	9.0	2.0	2.4	11.9	29.9	34.7	35.8	40.8	51.8	64.7	74.3	72.1
1942–44	34.1	9.3	2.3	2.8	12.5	28.5	34.4	36.9	41.8	53.8	65.4	74.7	72.8
1939–41	36.5	10.9	2.8	3.6	14.8	30.7	38.6	41.4	46.1	57.4	69.3	77.4	76.2
Male:													
1945	45.1	7.4	1.8	1.9	9.5	40.0	47.8	38.3	53.0	77.8	95.4	101.3	90.7
1944	45.0	9.1	2.0	1.9	9.0	31.3	39.4	39.1	54.3	80.2	99.3	103.1	90.8
1942–44	44.1	9.4	2.4	2.4	9.7	26.1	34.6	40.4	55.3	82.2	98.6	101.9	88.4
1939–41	44.2	11.0	3.0	2.9	10.7	24.2	34.5	43.6	58.7	84.0	99.8	100.7	86.6
Female:													
1945	21.7	7.4	1.8	2.8	13.1	26.5	30.3	30.2	26.5	22.4	26.1	41.7	57.2
1944	23.3	8.8	1.9	2.8	14.6	28.9	31.6	32.8	28.0	23.1	29.1	47.0	56.0
1942–44	24.5	9.2	2.2	3.3	15.3	30.4	34.2	33.8	28.8	24.8	31.2	48.7	59.3
1939–41	28.7	10.9	2.7	4.3	18.9	37.0	42.5	39.3	33.5	29.3	37.6	54.7	67.1
Nonwhite, both sexes:													
1945	102.1	29.5	8.7	19.0	91.8	184.3	178.6	150.1	142.7	140.6	129.3	115.8	86.1
1944	106.2	35.9	10.0	20.4	97.9	188.9	174.5	156.1	147.0	145.4	130.2	118.4	81.4
1942–44	111.7	34.5	11.3	24.4	108.4	188.2	175.2	167.8	151.9	154.3	137.8	123.7	81.4
1939–41	127.1	45.5	15.4	30.7	129.1	203.0	201.5	191.0	171.8	167.8	139.0	123.4	83.6
Male:													
1945	119.7	31.0	8.8	14.4	73.8	193.5	200.8	181.1	185.2	207.2	178.8	168.1	119.5
1944	122.7	38.5	8.9	15.5	80.2	188.1	195.9	180.2	191.5	212.3	181.1	154.2	120.8
1942–44	125.7	37.1	11.2	18.3	86.1	171.9	183.5	191.2	194.4	217.2	187.6	162.9	122.0
1939–41	137.0	47.4	16.2	22.2	96.8	183.6	195.3	208.5	213.2	225.0	178.2	164.7	116.2
Female:													
1945	86.5	28.0	8.5	23.5	108.0	178.7	162.1	125.4	105.0	75.0	75.4	59.8	57.6
1944	91.3	33.2	11.0	25.3	114.3	189.5	160.2	136.6	107.5	78.6	74.1	79.9	47.9
1942–44	98.5	31.8	11.4	30.3	129.7	201.4	168.7	147.5	113.2	90.6	82.5	81.7	46.7
1939–41	117.5	43.5	14.6	39.1	159.7	219.8	207.0	174.9	132.7	107.5	94.7	78.6	55.0

[1] See footnote at end of table.

TABLE 2.—*Death rates and number of deaths for tuberculosis (all forms), by age, race, and sex: United States, 1939–41 average, 1942–44 average, 1944, and 1945*—Con.

Race, sex, and year	All ages [1]	Under 5	5–9	10–14	15–19	20–24	25–29	30–34	35–44	45–54	55–64	65–74	75 and over
	Number of deaths from tuberculosis												
All races, both sexes:													
1945	52,916	1,332	311	476	2,288	4,478	4.759	4,776	9,508	9,521	7,981	5,174	2,266
1944	54,731	1,550	342	496	2,498	4,831	4,884	4,995	9.734	9,707	8,174	5.316	2,161
1942–44	56,475	1,539	384	602	2,786	5,075	5,231	5,267	9.980	10,035	8,121	5,271	2,128
1939–41	60,429	1.613	475	799	3,388	5,719	6,236	5,811	10,846	10,373	7,960	5,104	2,052
Male:													
1945	32,934	688	158	187	880	1,812	2,123	2,494	6,085	7,309	6,220	3,632	1,318
1944	33,717	816	168	197	949	1,960	2,212	2,548	6.207	7,455	6.308	3.591	1,279
1942–44	34,435	808	199	240	1,076	2,061	2,383	2,755	6,365	7,611	6,159	3,522	1,221
1939–41	35,483	831	251	306	1,234	2,306	2,782	3.038	6.803	7,650	5,786	3,308	1,109
Female:													
1945	19,982	644	153	289	1,408	2,666	2,636	2,282	3.423	2,212	1,761	1.542	948
1944	21,014	734	174	299	1,549	2,871	2.672	2,447	3,527	2,252	1,866	1,725	882
1942–44	22.041	731	185	362	1.710	3,014	2,848	2.512	3,614	2,424	1,962	1.750	906
1939–41	24,996	782	224	493	2,154	3,413	3,454	2,773	4,043	2,723	2,174	1,796	943
White, both sexes:													
1945	38,623	856	178	219	1,082	2,434	2,904	3,113	6,743	7,495	6,854	4,644	2,078
1944	39,958	995	193	221	1,185	2.632	2.996	3,287	6,909	7,666	7,066	4.785	1,991
1942–44	40,824	1,002	219	271	1,302	2,736	3,203	3,436	7,057	7,907	6.971	4,725	1,965
1939–41	43,282	1.014	265	372	1,617	3,180	3,828	3,827	7.605	8,183	6,865	4,596	1,904
Male:													
1945	25,055	438	90	90	420	1,002	1,327	1,605	4,401	5,827	5,407	3,234	1,198
1944	25,596	518	101	93	431	1,065	1,364	1,665	4.476	5,966	5,500	3,233	1,183
1942–44	25,886	519	117	116	499	1.099	1,446	1,789	4.583	6,104	5,335	3,149	1,109
1939–41	26,350	520	141	152	589	1,239	1,690	2,000	4,848	6,143	5,042	2,955	1,013
Female:													
1945	13,568	418	88	129	662	1,432	1,577	1,508	2,342	1,668	1,447	1,410	880
1944	14,362	477	92	128	754	1,567	1,632	1,622	2,433	1,700	1,566	1,552	828
1942–44	14,939	483	102	155	803	1,637	1,757	1,647	2,474	1,803	1,635	1,576	856
1939–41	16,932	494	124	220	1,028	1,941	2,138	1,827	2,757	2,040	1,823	1,641	891
Nonwhite, both sexes:													
1945	14,293	476	133	257	1,206	2,044	1,855	1,663	2,765	2,026	1,127	530	188
1944	14.773	555	149	275	1,313	2,199	1,888	1.708	2,825	2.041	1,108	531	170
1942–44	15,651	537	164	331	1,484	2,339	2.029	1,831	2,922	2,128	1,151	546	163
1939–41	17,147	599	210	427	1,771	2,539	2,408	1,984	3,241	2,190	1,095	508	148
Male:													
1945	7.879	250	68	97	460	810	796	889	1,684	1,482	813	398	120
1944	8,121	298	67	104	518	895	848	883	1,731	1,489	808	358	116
1942–44	8,549	289	82	124	577	962	937	966	1,782	1,507	824	372	113
1939–41	9,083	311	110	154	645	1,067	1,092	1,038	1,955	1,507	744	353	96
Female:													
1945	6,414	226	65	160	746	1,234	1,059	774	1,081	544	314	132	68
1944	6,652	257	82	171	795	1,304	1.040	825	1,094	552	300	173	54
1942–44	7,102	248	83	207	907	1,377	1,092	864	1,140	621	327	174	50
1939–41	8,064	288	100	273	1,126	1,472	1,316	946	1,286	683	351	155	52

[1] Includes ages not stated.

Although this peak in the death rates for males is only apparent, arising from the change in population, the rates for females show a real peak (25–29 for white females and 20–24 for nonwhite females) which has been evident for some years. This peak is more obvious in the rate for nonwhite females than in the rate for white females. The rate for white females follows the same pattern as that for males, although both decline somewhat in the middle years before rising to a maximum at the older ages. On the other hand, the highest rate for nonwhite females is found at the young adult ages, from which point there is a fairly steady decline to the older ages.

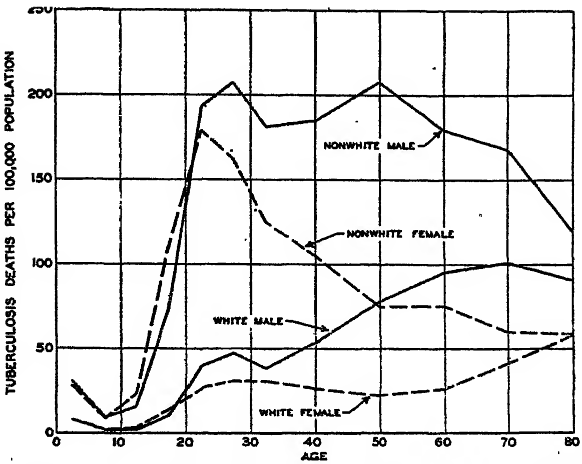

FIGURE 2.—Death rates for tuberculosis (all forms) by age, race, and sex: United States, 1945.

A comparison of this series of rates with the rates for 1944, 1942–44, and 1939–41, given in table 2, shows that the distribution of tuberculosis mortality by age, race, and sex in 1945 is very similar to the distribution for previous years.

Tuberculosis death ratios.—The tuberculosis death ratio, or the number of deaths from tuberculosis per 100 deaths from all causes, is an index of the relative importance of tuberculosis as a cause of death. For the total population and particularly for the age groups from which the military population is drawn, this measure is less affected than is the tuberculosis death rate by the exclusion of the overseas population, a group with a low general death rate. The tuberculosis death ratios for 1945 by age, race, and sex are shown in figure 3.

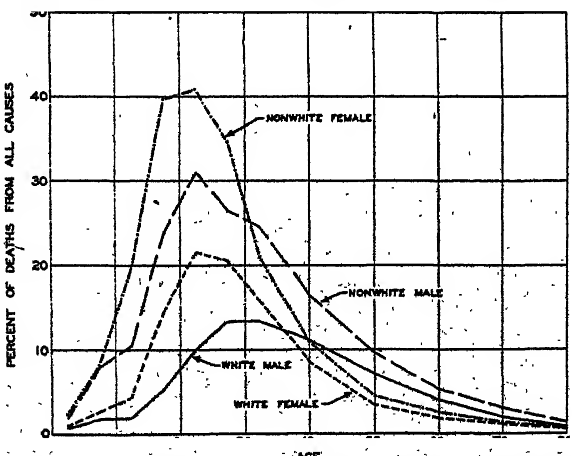

FIGURE 3.—Death from tuberculosis (all forms) as percentage of deaths from all causes by age, race, and sex: United States, 1945.

The curves of the death ratios for the four race-sex groups are typical of those found in previous years. All four curves reach their maximum at the young adult ages and then decline at the middle and older ages. Thus, once again it is demonstrated that tuberculosis as a cause of death is of relatively greater importance among young adults than among older persons, even though the tuberculosis death rates tend to be higher at the older ages (except among the nonwhite females). At the young adult ages, the death ratios for both nonwhite groups are higher than those for whites, and similarly those for each of the two female populations are higher than the corresponding values for males. After age 40, however, the death ratios for females decline rapidly, and from that point the death ratios for both male groups are higher than those for females.

A reading of the maximum points of the four curves indicates that at ages 20–24, tuberculosis accounted for two-fifths of all deaths among nonwhite females, one-third of those among nonwhite males, and one-fifth of those among white females. The peak of the curve for white males is at ages 30–34, in which group tuberculosis accounted for 13.5 percent of all deaths.

Distribution of tuberculosis deaths by age.—A study of the percentage distribution of tuberculosis deaths in the various age groups (table 3) gives additional evidence of the importance of tuberculosis at the young adults ages. Although the long term trend has been toward an increasing proportion of deaths at the older ages, in 1945 over two-fifths (44.4 percent) of all tuberculosis deaths still occurred in the 20–44 age group.

TABLE 3.—*Percentage distribution of tuberculosis deaths, by age and sex: United States, 1945*

Age groups	Total	Male	Female
All ages [1]	100.0	62.2	37.8
Under 20 years	8.3	3.6	4.7
20-44 years	44.4	23.6	20.8
45-64 years	33.1	25.6	7.5
65 years and over	14.1	9.4	4.7

[1] Includes ages not stated.

Pronounced differences exist between the age distributions of deaths of the two sex groups. Well over half of the tuberculosis deaths among females occur between ages 20–44. In the male population only about 40 percent of the deaths are in this group, with about the same number between ages 45–64.

In figure 4, it may be seen that the proportion of all deaths from tuberculosis which occurs above age 45 has been increasing. The proportions for the age groups 45–64 and "65 and over" increased

from 30.3 and 11.8 percent in 1939–41 to 33.1 and 14.1 in 1945. At the same time proportions for the age groups "under 20" and 20–44 decreased from 10.4 and 47.3 in 1939–41 to 8.3 and 44.4 in 1945. Two factors may be cited in the explanation of these shifts; first, the more rapid decline of the tuberculosis death rate at the younger ages; and second, the aging of the population.

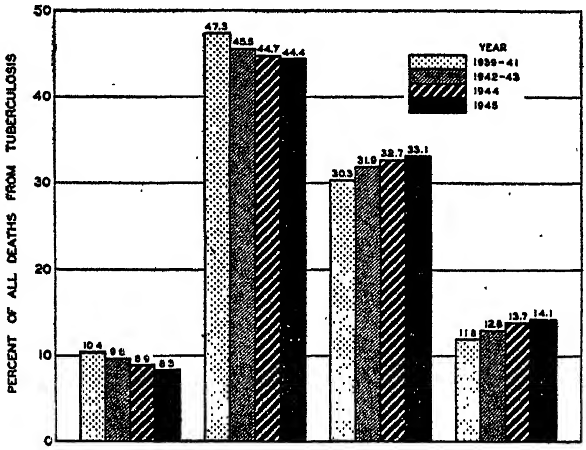

FIGURE 4.—Percentage distribution of deaths from tuberculosis (all forms) by age: United States, 1939–41 average, 1942–44 average, 1944, and 1945.

Tuberculosis mortality among war veterans.—In 1945, there were 4,437 deaths from tuberculosis among veterans of all wars. Of these, 62.8 percent were among veterans of World War I and 31.4 percent among veterans of World War II. These figures include deaths among military personnel on active duty with the armed forces within the continental limits of the United States as well as deaths among those who have been discharged from the services. Although veteran status may not always be reported on the death certificate, it is probable that these figures understate somewhat the actual number of deaths among veterans.

The number of deaths from tuberculosis among veterans of World War II increased from 974 in 1944 to 1,394 in 1945. Because veterans of World War II represent a physically selected group in which

TABLE 4.—*Number of deaths from tuberculosis (all forms) among war veterans: United States, 1944 and 1945*

Year	Total	World War I	World War II	World Wars I and II	Other wars
1945	4,437	2,785	1,394	26	232
1944	4,370	3,009	974	7	380

mortality from tuberculosis is far lower than in the general population of the same age and sex, and because every effort was made to screen the tuberculous by preinduction X-ray examination, this increase may be of particular significance. In this connection, the mortality figures cited in a recent report [4] for members of the Army of the United States are of interest. A combined rate for present and past members of the Army who have served since December 8, 1941, is reported to have increased from 3 per 100,000 in 1942 to approximately 12 in 1945. As pointed out in the report, the increase in the rate "gives an indication of the extent and rapidity with which tuberculosis may develop in a screened population."

Tuberculosis deaths among World War II veterans constituted 31.4 percent of the tuberculosis deaths among all veterans in 1945, as compared with 22.3 in 1944. This increase in the proportion is due to a decrease in the number of deaths among World War I veterans as well as to the increase in the number of deaths among veterans of World War II, mentioned above. It is to be expected that the proportion will continue to increase as advancing age takes its toll among veterans of World War I and as veterans of World War II reach the age at which the mortality from tuberculosis is highest.

Tuberculosis mortality among nonwhite race groups.—Table 5 presents the number of deaths and death rates for tuberculosis (all forms) from 1940 to 1945 for the nonwhite population and the principal nonwhite race groups. The total number of deaths among nonwhites in 1945 was 14,293. Of these, 91.8 percent occurred among Negroes, 5.4

TABLE 5.—*Number of deaths and death rates for tuberculosis (all forms) for nonwhites, by specified race: United States, 1940–45*

Race and year	Number of deaths	Rate per 100,000 population	Race and year	Number of deaths	Rate per 100,000 population
Nonwhite total:			Chinese:		
1945	14,293	102.1	1945	210	276.1
1944	14,773	106.2	1944	229	311.4
1943	15,796	112.9	1943	224	290.6
1942	16,394	118.4	1942	199	256.8
1941	16,968	124.2	1941	203	262.8
1940	17,217	127.6	1940	208	268.1
Negro:			Japanese:		
1945	13,114	98.0	1945	116	101.5
1944	13,538	101.[illegible]	1944	128	106.1
1943	14,513	108.4	1943	138	112.5
1942	15,107	114.2	1942	142	116.9
1941	15,702	120.2	1941	137	112.3
1940	15,883	123.1	1940	144	113.7
Indian:			Other:		
1945	777	211.9	1945	76	134.4
1944	798	221.4	1944	80	148.7
1943	823	230.0	1943	98	185.7
1942	836	239.0	1942	100	194.7
1941	836	242.7	1941	90	179.1
1940	867	258.0	1940	115	227.9

[4] Long, Esmond R.: Tuberculosis in a screened population. American Review of Tuberculosis, vol. 54, No. 3 (1946).

percent among Indians, and the remaining 2.8 percent among Chinese, Japanese, and other racial groups.

The tuberculosis death rate for all nonwhites in 1945 was 102.1 per 100,000 population. The rates for the several nonwhite racial groups ranged from 98.0 and 101.5 for Negroes and Japanese to 211.9 and 276.1 for Indians and Chinese, respectively. The rate for the Chinese was almost 3 times as high as the rate for Negroes and almost 9 times as high as the rate for the white population.

In interpreting the differences in the rates for the several nonwhite race groups, a number of factors should be taken into consideration. Important among these are the age-sex composition of the populations of the nonwhite race groups and the completeness with which deaths are registered.

For example, of the nonwhite populations, the distribution of the Chinese by sex and age differs most from that of the general population. Among the Chinese in the United States, males greatly outnumber females, and the population is characterized by a high proportion of persons at the older ages. Thus the population of this race group is heavily weighted by those in the age-sex groups in which tuberculosis death rates are highest.

Quantitative data on the completeness with which deaths are registered are almost completely lacking. However, the indications afforded by extraordinarily low death rates recorded for some areas, information on the proportion of deaths occurring outside of hospitals or institutions, and the results of a test of completeness of birth registration made in 1940,[5] are that deaths of nonwhites are less completely registered than those of whites. Consequently, the recorded rates may be interpreted as a minimum statement of the seriousness of the tuberculosis problem among the nonwhite races.

Throughout the 6-year period, 1940–45, the tuberculosis death rates for Negroes and for Indians have presented a pattern of steady decrease, similar to that for whites. A marked trend in the series of rates for Japanese and Chinese is less easily distinguished. Although the rate for the Japanese appears to have declined and that for Chinese to have remained high, the rates are based on very small numbers and the changes which may be observed are not beyond the bounds of chance fluctuation.

TUBERCULOSIS MORTALITY BY STATES

The tuberculosis death rates for residents of the 48 States and the District of Columbia ranged in 1945 from 10.9 per 100,000 population for residents of Wyoming to 72.1 and 123.1 for residents of New Mexico

[5] Studies in Completeness of Birth Registration, Part I, Vital Statistics—Special Reports, vol. 17, No. 18, pp. 228–29 (1943).

and Arizona, respectively. The rate for Wyoming was the lowest ever recorded for any State. For one-fourth of the States, the rates were less than 28.2, and for one-half of the States the rates were less than 37.3. The rates for the top one-fourth of the States were greater than 43.6.

The geographic distribution of the tuberculosis death rates in 1945 is shown in figure 5. Two clearly defined areas, one of relatively low

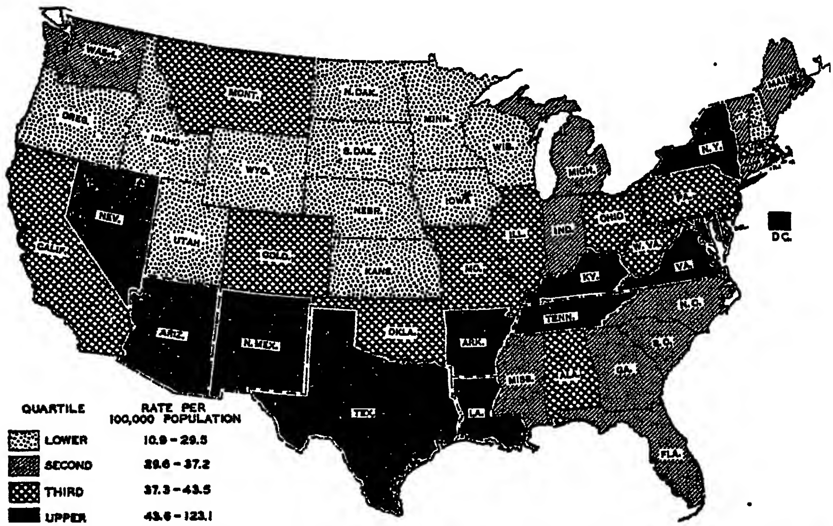

FIGURE 5.—Geographic distribution of the mortality from tuberculosis (all forms) in the United States: 1945.

and the other of relatively high mortality, may be distinguished. The area of low mortality extends from the Pacific northwest to the Great Lakes. New Hampshire is the only State in the lower quartile outside this area. The area of relatively high mortality has the form of a curving band and extends from the southwestern part of the country to the Atlantic coast. Included in this area are all the States in the upper quartile with the exception of New York. The distribution described for 1945 is very similar to that observed in previous years.

The geographic differences in tuberculosis mortality are not easily explainable. Not all of the variations in these rates reflect real differences in the force of tuberculosis mortality as influenced by environmental and other conditions, by programs for the control of the disease, and by facilities available for the care of the tuberculous. Nor does the fact that the rates for two States are identical indicate necessarily that the two areas are alike with respect to the underlying force of tuberculosis mortality. Part of the difference or agreement in the rates may be only apparent and result from variations in the accuracy of diagnosis and in the completeness with which tuberculosis

deaths are reported. Again, the population of a State may be affected by in-migration of the tuberculous attracted by the climate or by the facilities for their care. In addition, the crude death rate is greatly influenced by the age-race-sex composition of the population. Detailed population data, required for an evaluation of this factor, are not available. The usual methods of estimating the population by age, race, and sex for the individual States were not valid for the war years, because of the unprecedented migration of the population and the complication that relatively large proportions of the population of the different States were in the armed forces and were stationed in other parts of the country or were overseas.

Differences in tuberculosis mortality, by States: 1944 to 1945.—Table 6 gives the number of deaths from tuberculosis (all forms) and the tuberculosis death rate for each State and the District of Columbia for 1944 and 1945, and the average annual number of deaths and corresponding death rates for the prewar period 1939–41 and the first three years of the war, 1942–44. The table also gives the percentage differences between the rates for 1944 and 1945 and the percentage differences between the average annual rates for 1939–41 and 1942–44.

It will be seen that the majority of the States contributed in 1945 to the decrease which occurred in the tuberculosis death rate for the United States. Thirty-six States reported lower tuberculosis death rates for 1945 than for 1944. On the other hand, the rates for 11 States were higher than in 1944, and those for 2 States remained the same.

The percentage differences between the rates for the 2 years varied over a wide range from −20.6 percent to +38.0 percent. The differences in the rates for the majority of the States were smaller than the 2 extremes would indicate. For the 25 States in the middle range, the differences varied between −0.5 and −7.4 percent.

Some fluctuation is to be expected in the tuberculosis death rate for a State from year to year, especially in the rate for a State that has a small population. In addition, the crude rates for some States were affected during the war by sudden changes in the age-race-sex composition of their populations, changes which were not reflected in the estimated populations on which the rates are based. For example, the opening or closing of a large military establishment in a State had the effect of augmenting or decreasing the population by a selected group of healthy males of an age group for which mortality was low.

Although the percentage differences in the rates for some States are large, only those for four States are statistically significant. The four States are Florida, New Jersey, and Ohio with decreases of 10.7,

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Table 6.—*Number of deaths from tuberculosis (all forms), death rates and percentage changes in rates, by State: United States, 1939–41 average, 1942–44 average, 1944, and 1945*

[By place of residence]

Area	Number of deaths				Rate per 100,000 population				Percentage change in rates	
	1945	1944	1942–44 average	1939–41 average	1945	1944	1942–44 average [1]	1939–41 average [2]	1944 to 1945	1939–41 to 1942–44
United States	52,916	54,731	56,475	60,429	40.1	41.3	42.3	45.8	−2.9	−7.7
Alabama	1,218	1,269	1,285	1,518	43.3	45.0	44.6	53.4	−3.8	−16.5
Arizona	776	784	716	724	123.1	122.9	113.7	144.3	+.2	−21.2
Arkansas	817	826	931	1,009	45.9	46.5	49.7	51.7	−1.3	−3.9
California	3,827	3,826	3,858	3,838	43.4	43.7	46.5	55.1	−.7	−15.6
Colorado	426	419	462	503	38.0	36.5	40.5	44.7	+4.1	−9.4
Connecticut	664	661	638	616	37.2	37.2	35.9	35.9	0	0
Delaware	109	123	127	152	38.0	43.3	45.0	56.9	−12.3	−20.9
District of Columbia	541	547	544	548	57.6	58.6	60.7	80.0	−1.7	−24.1
Florida	739	823	849	944	31.0	34.7	37.0	49.4	−10.7	−25.1
Georgia	1,108	1,141	1,256	1,510	34.7	35.4	39.0	48.2	−2.0	−19.1
Idaho	81	109	96	99	16.2	20.4	19.1	18.8	−20.6	+1.6
Illinois	3,184	3,218	3,302	3,663	41.2	41.6	42.3	46.3	−1.0	−8.6
Indiana	1,133	1,221	1,250	1,398	33.0	35.7	36.4	40.7	−7.6	−10.6
Iowa	355	341	388	450	15.7	15.0	16.6	17.7	+4.7	−6.2
Kansas	339	357	380	423	19.5	20.1	21.5	23.6	−3.0	−8.9
Kentucky	1,605	1,726	1,784	1,961	62.3	65.7	65.7	68.7	−5.2	−4.4
Louisiana	1,092	1,158	1,220	1,347	44.5	45.7	47.9	56.8	−2.6	−15.7
Maine	244	279	271	268	31.0	35.2	33.3	31.7	−11.9	+5.0
Maryland	1,267	1,326	1,305	1,268	59.6	62.3	63.0	69.4	−4.3	−9.2
Massachusetts	1,643	1,698	1,716	1,623	39.3	40.8	40.3	37.6	−3.7	+7.2
Michigan	1,816	1,814	1,858	1,828	33.2	33.4	34.0	34.7	−.6	−2.0
Minnesota	621	693	702	758	24.9	27.6	27.2	27.1	−9.8	+0.4
Mississippi	720	831	952	1,074	34.6	38.2	43.0	49.0	−9.4	−12.3
Missouri	1,424	1,487	1,573	1,783	40.0	41.4	42.4	47.1	−3.4	−10.0
Montana	171	175	194	235	37.4	37.6	39.7	42.0	−.5	−5.5
Nebraska	185	211	200	225	15.4	17.4	16.3	17.1	−11.5	−4.7
Nevada	89	76	82	70	55.7	48.6	56.2	63.7	+14.6	−11.8
New Hampshire	99	105	114	133	21.9	23.0	24.5	27.0	−4.8	−9.3
New Jersey	1,737	1,856	1,890	1,852	41.3	44.5	44.7	44.4	−7.2	+.7
New Mexico	386	345	334	357	72.1	64.9	62.8	66.8	+11.1	−6.0
New York	6,032	6,055	6,154	6,244	47.9	47.9	48.0	46.3	0	+3.7
North Carolina	1,262	1,239	1,355	1,598	36.0	35.1	37.9	44.6	+2.6	−15.0
North Dakota	117	86	110	127	22.5	16.3	19.9	19.8	+38.0	+.5
Ohio	2,631	2,787	2,809	2,913	38.3	40.8	40.8	42.1	−6.1	−3.1
Oklahoma	830	880	931	1,104	40.8	42.6	43.4	47.3	−4.2	−8.3
Oregon	308	307	292	307	25.5	25.3	24.7	28.1	+.8	−12.1
Pennsylvania	3,832	4,020	4,095	4,231	41.7	43.5	43.2	42.7	−4.1	+1.2
Rhode Island	252	300	292	265	33.2	38.4	38.5	37.1	−13.6	+3.8
South Carolina	663	660	718	876	34.8	34.4	36.6	45.9	+1.2	−20.3
South Dakota	156	178	180	197	28.1	31.9	31.3	30.7	−11.9	+2.0
Tennessee	1,776	1,881	1,981	2,298	61.7	65.6	67.8	78.6	−6.0	−13.8
Texas	2,966	3,126	3,358	3,814	43.7	45.4	49.0	59.4	−3.8	−17.5
Utah	79	73	75	86	12.8	12.0	12.4	15.5	+6.7	−20.0
Vermont	110	124	118	144	35.4	39.9	36.2	40.1	−11.3	−9.7
Virginia	1,366	1,344	1,475	1,628	44.4	42.0	47.6	60.5	+5.7	−21.3
Washington	706	702	699	689	33.8	34.1	35.1	39.6	−.9	−11.4
West Virginia	719	764	766	880	41.7	44.6	43.3	46.1	−6.5	−6.1
Wisconsin	668	726	754	806	22.6	24.4	24.8	25.6	−7.4	−3.1
Wyoming	27	34	36	45	10.9	13.2	14.2	18.0	−17.4	−21.1

[1] Based on average 1942-44 population.
[2] Based on 1940 population.

7.2, and 6.1 percent, respectively, and North Dakota with an increase of 38.0 percent.[6]

During the four war years, 1942–45, the tuberculosis death rates for 41 States and the District of Columbia were generally lower than during the previous period 1939–41. For seven States, however, the average annual tuberculosis death rate for the war period was higher than the prewar average. These States were Connecticut, Maine, Massachusetts, New York, North Dakota, Pennsylvania, and Rhode Island. With the exception of North Dakota, these are States in the northeastern part of the country.

From the standpoint of public health administration and the provision of facilities for the diagnosis and care of the tuberculous, information on the number of tuberculosis deaths occurring in a population is as important as information on the tuberculosis death rate. It may therefore be well to consider the changes in the number of tuberculosis deaths among residents of the individual States. Of the 7 States in which the tuberculsis death rate was higher in the war years than in the prewar period, three also reported a larger average annual number of deaths from tuberculosis. These States were Connecticut (with an average of 664 deaths for 1942–45 as compared with 616 for 1939–41), Massachusetts (1,698 as compared with 1,623), and Rhode Island (282 as compared with 265). The remaining 4 States (Maine, New York, North Dakota, and Pennsylvania) reported a smaller average number of deaths. Several of the States in which the tuberculosis death rates declined during the war years reported a larger average annual number of tuberculosis deaths for the war years than for the prewar period. These States were Arizona, California, Maryland, Michigan, Nevada, and Washington. The civilian populations of all of these States increased during the war, and it is possible that part of the increase in the number of tuberculosis deaths in these States is a result of an increased population.

From data available on a national level and because of the absence of detailed information on the populations of the States, it is difficult to evaluate the changes in the total tuberculosis figures for the individual States. Knowledge of local conditions often will aid understanding of the changes which may be taking place in tuberculosis mortality. However, there are also available, both on a local and a national level, data on the distribution of tuberculosis deaths by age, race, and sex. This additional information may be of considerable

[6] The apparent increase in the rate for North Dakota follows a sharp decrease of approximately the same magnitude which occurred in 1944. The reported rates for 1939–41, 1942, and 1943 were: 19.8, 20.7, and 22.7 per 100,000 population. The rate then dropped to 16.3 in 1944, and in 1945 returned to its earlier level, the rate for the year being 22.5. (The corresponding numbers of deaths were 127, 121, 123, 86, and 117.) In relation to the figures for other years the rate for 1944 is seemingly aberrent and little or no significance can be attached to the apparent increase in the rate for 1945.

value in interpretation, especially when viewed in relation to comparable information for past years and in relation to the corresponding distributions of deaths from all causes. Since tuberculosis is a preventable disease and there is a considerable body of knowledge concerning its prevention, it is not unreasonable to expect a decrease in the number of deaths from tuberculosis over a period of time and under normal conditions. For the same reasons, the mortality from tuberculosis may be expected to decline more rapidly than the total mortality, a situation indicated by a decrease in the ratio of deaths from tuberculosis to deaths from all causes. A study, then, of the changes in the numbers of deaths from tuberculosis and the tuberculosis death ratios for the several age-race-sex groups may assist in determining in what segments of the population the changes in tuberculosis mortality are taking place and where further study should be directed.

The presentation of detailed mortality data for all States is beyond the scope of this report. However, it may be desirable to illustrate this general method of approach for at least one State, selecting the State showing the largest significant percentage decrease in its tuberculosis death rate in 1945. This State is Florida, in which the tuberculosis death rate decreased from 34.7 per 100,000 population in 1944 to 31.0 in 1945. Table 7 gives the numbers of deaths from tuberculosis and from all causes by age, race, and sex for residents of Florida for the years 1941–45 and the corresponding ratios of deaths from tuberculosis to deaths from all causes.

A total of 739 deaths from tuberculosis were reported for residents of Florida in 1945, 10 percent less than the number reported for 1944. On examining this decrease, three main observations may be drawn from the data shown in table 7. First, the entire decrease is due to a decrease in the number of tuberculosis deaths occurring among females. Whereas the number of deaths among males in 1945 was almost exactly the same as the number in 1944, the number among white females dropped from 121 in 1944 to 92 in 1945, and the number among nonwhite females, from 203 to 149. Second, the decrease in the number of tuberculosis deaths among both white and nonwhite females was greater than would be expected from the changes that occurred in the years immediately preceding. The number of deaths among nonwhite females declined gradually from 1941–44, and the number of deaths of white females remained rather constant from one year to the next. Third, the decrease in the tuberculosis death ratios for both white and nonwhite females in 1945 was likewise greater than would have been expected on the basis of changes occurring in the previous years. Since the decreases in the number of tuberculosis deaths and in the tuberculosis death ratios for females deviate

markedly from the past trend and are counter to the experience for males, further investigation would seem called for. Pending such investigation, it would seem desirable to reserve judgment on the significance of the reported decrease in the total tuberculosis mortality for the State.

TABLE 7.—*Number of deaths from tuberculosis (all forms) and from all causes and deaths from tuberculosis as percentages of deaths from all causes, by age, race, and sex: Florida, 1941–45*

[By place of residence]

Race and year	Male					Female				
	All ages [1]	Under 15 years	15–44 years	45–64 years	65 years and over	All ages [1]	Under 15 years	15–44 years	45–64 years	65 years and over
	Tuberculosis deaths per 100 deaths from all causes									
White:										
1945	2.6	0.4	4.4	4.2	1.6	1.5	0.7	6.1	1.6	0.6
1944	2.5	.4	3.8	4.2	1.3	2.0	.1	7.5	2.8	.7
1943	2.5	.1	3.4	4.3	1.4	2.0	1.1	7.0	1.9	1.0
1942	3.0	.3	5.3	4.6	1.5	2.1	.9	6.9	2.1	1.2
1941	2.9	.7	6.1	4.3	1.4	2.2	.4	8.3	2.2	.8
Nonwhite:										
1945	6.2	.3	13.5	5.5	1.1	4.9	.9	11.7	2.1	.5
1944	6.3	.9	14.9	4.2	1.6	6.5	1.0	15.7	2.7	.4
1943	6.4	1.1	14.6	4.3	1.3	7.0	1.6	15.5	4.1	.4
1942	6.5	1.7	13.4	4.8	1.6	7.5	1.0	17.0	3.1	.9
1941	7.1	1.6	14.3	6.0	.8	7.8	1.2	17.7	2.8	.2
	Number of deaths from tuberculosis (all forms)									
White:										
1945	257	4	72	113	68	92	5	45	23	19
1944	258	4	80	118	56	121	1	58	39	23
1943	253	1	82	115	55	120	8	54	27	31
1942	250	3	81	114	52	118	6	51	28	33
1941	244	7	75	108	54	125	3	71	30	21
Nonwhite:										
1945	241	2	155	75	8	149	4	119	22	3
1944	241	6	167	57	11	203	5	168	28	2
1943	253	7	177	58	10	229	8	173	45	2
1942	262	11	173	67	11	240	5	200	30	5
1941	308	10	207	84	7	255	6	218	30	1
	Number of deaths from all causes									
White:										
1945	9,776	1,005	1,654	2,722	4,379	6,071	738	733	1,431	3,163
1944	10,378	1,088	2,130	2,839	4,307	6,187	808	770	1,404	3,201
1943	10,241	1,074	2,391	2,652	4,068	5,946	742	773	1,414	3,012
1942	8,464	886	1,532	2,461	3,567	5,498	680	734	1,304	2,777
1941	8,414	940	1,223	2,506	3,738	5,609	705	859	1,390	2,652
Nonwhite:										
1945	3,857	611	1,152	1,375	708	3,072	453	1,019	1,046	548
1944	3,815	643	1,123	1,348	688	3,120	498	1,067	1,047	501
1943	3,984	634	1,212	1,353	768	3,291	513	1,116	1,107	549
1942	4,060	659	1,292	1,400	699	3,185	486	1,179	983	528
1941	4,336	635	1,448	1,411	826	3,273	487	1,233	1,073	475

[1] Includes ages not stated.

Attention also may be directed to the series of tuberculosis death ratios for white males 15–44 years of age for Florida, shown in table 7. The ratio for this group decreased rapidly from 6.1 per 100 deaths from all causes in 1941 to 3.4 in 1943 and then rose to 4.4 in 1945. These

changes will be found related, not to changes in the number of deaths from tuberculosis, but to changes in the number of deaths from all causes. The number of deaths from all causes in this group increased from 1,223 in 1941 to 2,391 in 1943 (nearly double the 1941 figure) and then decreased to 1,654 in 1945. So large a change in total mortality would suggest a change in the population of white males of this age, a change in the mortality risk to which this group was exposed, or to both. Very probably, the changes are, in part, a result both of the changes in the military population at camps and training centers in the State and of changes in the hazards of military training.

DEATHS FROM RESPIRATORY AND NONRESPIRATORY FORMS OF TUBERCULOSIS

Of the 52,916 deaths from tuberculosis in 1945, 48,879 or 92.4 percent were from tuberculosis of the respiratory system and 4,037 or 7.6 percent were from other forms of tuberculosis. The death rate for respiratory tuberculosis was 37.0 per 100,000 population and that for nonrespiratory tuberculosis, 3.1. In 1944 the corresponding rates were 38.3 and 3.0, respectively, and the nonrespiratory forms constituted 7.3 percent of all deaths from tuberculosis.

In table 8 are given the numbers of deaths and the corresponding death rates for the nonrespiratory forms of tuberculosis for the United States in 1945. Approximately one-quarter of the nonrespiratory deaths were from tuberculosis of the meninges and central nervous system and one quarter from disseminated tuberculosis. Tuberculosis of the intestines and peritoneum and tuberculosis of the vertebral column accounted for another quarter; tuberculosis of the genitourinary system, of the bones and joints, and of other organs, for the remainder.

TABLE 8.—*Number of deaths and death rates for tuberculosis by specified form: United States, 1945*

	Number of deaths	Rate per 100,000 population		Number of deaths	Rate per 100,000 population
All forms	52,916	40.1	Tuberculosis of the skin and subcutaneous cellular tissue	30	0
Tuberculosis of respiratory system	48,879	37.0	Tuberculosis of the lymphatic system (except bronchial, mediastinal, mesenteric, and retroperitoneal lymph nodes)	89	0.1
Tuberculosis (other forms)	4,037	3.1	Tuberculosis of the genito-urinary system	342	.3
Tuberculosis of the meninges and central nervous system	1,193	.9	Tuberculosis of other organs	87	.1
Tuberculosis of the intestines and peritoneum	657	.5	Disseminated tuberculosis	1,002	.8
Tuberculosis of the vertebral column	478	.4			
Tuberculosis of the bones and joints (except vertebral column)	159	.1			

Mortality trends from respiratory and nonrespiratory tuberculosis by race: 1910–1945.—Table 9 and figure 6 give the death rates for respiratory and for nonrespiratory tuberculosis by race for the death-registration States, 1910–45. In the 36 years since 1910, the total death rate for tuberculosis of the respiratory system has dropped from a maximum of 134.2 per 100,000 population in 1911 to a minimum of 37.0 in 1945; in the same period the rate for the nonrespiratory forms has declined from a maximum of 20.9 in 1911 to a minimum of 3.0 in 1944. The percentage decrease in the death rate for the nonrespiratory forms (86 percent) has been greater than the corresponding decrease in the rate for the respiratory forms (72 percent). As may be seen from the chart, the death rate for the nonrespiratory forms has declined more rapidly than has the rate for respiratory tuberculosis. The difference is more marked in the death rates for the white population than in those for the nonwhite.

TABLE 9.—*Death rates for tuberculosis of the respiratory system and for other forms by race: death-registration States, 1910–45*

[Rates per 100,000 population]

Year	Tuberculosis (all forms)			Tuberculosis of the respiratory system			Tuberculosis (other forms)		
	All races	White	Non-white	All races	White	Non-white	All races	White	Non-white
1945	40.1	32.7	102.1	37.0	30.5	92.3	3.1	2.3	9.8
1944	41.3	33.7	106.2	38.3	31.4	96.7	3.0	2.3	9.5
1943	42.6	34.3	112.9	39.1	31.8	102.9	3.4	2.6	10.9
1942	43.1	34.4	118.4	39.6	31.8	107.5	3.5	2.7	11.0
1941	44.5	35.4	124.2	40.9	32.7	112.4	3.7	2.7	11.8
1940	45.8	36.5	127.6	42.1	33.7	116.3	3.7	2.8	11.3
1939	47.1	37.7	129.1	43.1	34.7	117.0	4.0	3.1	12.1
1938	49.1	39.1	136.8	44.7	35.7	123.5	4.4	3.4	13.3
1937	53.8	43.4	145.0	49.2	39.8	131.6	4.7	3.7	13.5
1936	55.9	45.0	151.6	50.8	41.0	137.1	5.1	4.0	14.5
1935	55.1	44.9	145.1	49.9	40.8	130.5	5.2	4.1	14.7
1934	56.7	46.2	148.8	51.2	41.8	133.9	5.5	4.4	14.8
1933	59.6	48.5	157.7	53.7	43.7	142.0	5.9	4.8	15.7
1932	62.5	50.2	173.5	56.1	45.0	156.7	6.4	5.2	16.8
1931	67.8	54.2	191.1	60.4	48.2	170.9	7.4	6.0	20.2
1930	71.1	57.7	192.0	63.0	51.1	170.3	8.1	6.6	21.7
1929	75.3	62.4	192.0	67.0	55.5	171.3	8.3	6.9	20.8
1928	78.3	64.9	199.5	69.3	57.2	178.6	9.0	7.7	20.9
1927	79.6	66.5	208.7	70.1	58.5	184.8	9.5	8.0	24.0
1926	85.5	72.0	223.8	74.9	63.0	198.3	10.5	9.1	25.5
1925	84.8	71.6	221.3	74.1	62.2	196.7	10.7	9.3	24.6
1924	87.9	74.9	218.6	76.5	64.9	193.0	11.4	10.0	25.6
1923	91.7	79.5	213.1	80.4	69.3	190.6	11.4	10.3	22.5
1922	95.3	82.6	218.9	83.3	71.6	196.2	12.0	10.9	22.7
1921	97.6	84.7	239.3	84.5	72.7	213.1	13.2	12.0	26.2
1920	113.1	99.5	262.4	99.8	87.1	238.0	13.4	12.4	24.4
1919	125.6	110.9	284.0	111.3	97.5	258.9	14.4	13.4	25.2
1918	149.8	134.3	346.0	132.9	118.5	315.5	16.9	15.8	30.4
1917	143.5	129.6	332.6	126.2	113.5	298.8	17.3	16.1	33.8
1916	138.4	125.7	322.7	121.0	109.2	292.0	17.4	16.5	30.6
1915	140.1	128.5	401.1	122.6	112.0	360.7	17.5	16.5	40.4
1914	141.7	130.3	396.7	123.0	112.7	352.6	18.7	17.6	44.1
1913	143.5	132.6	386.5	123.7	113.9	343.7	19.7	18.7	42.8
1912	145.4	136.0	429.0	125.9	117.4	380.4	19.5	18.5	48.7
1911	155.1	145.0	461.4	134.2	125.1	410.3	20.9	19.9	51.0
1910	153.8	145.9	445.5	133.3	126.2	393.7	20.6	19.7	51.8

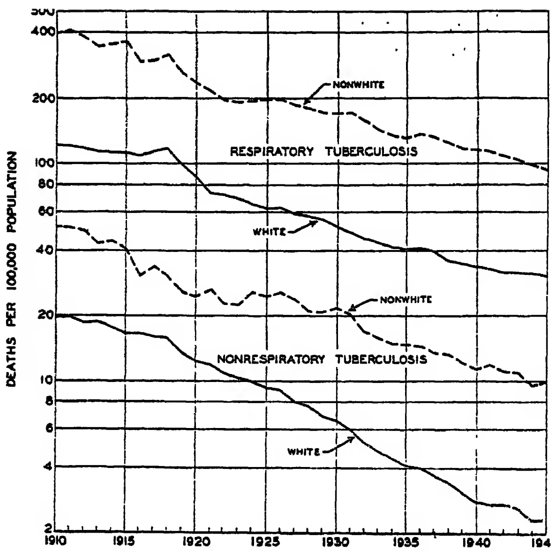

FIGURE 6.—Death rates for tuberculosis of the respiratory system and for other forms, by race: Death-registration States, 1910–45.

The respiratory tuberculosis death rate for the white population has declined from 126.2 per 100,000 population in 1910 to 30.5 in 1945. In the same period, the rate for nonwhites dropped from a maximum of 410.3 in 1911 to 92.3 in 1945. The rates of decline for the two racial groups have been very similar.

In the case of the nonrespiratory forms of tuberculosis, however, the death rate for whites has declined more rapidly than has the rate for nonwhites. In the 36-year period for which data are shown, the nonrespiratory tuberculosis death rate for whites has dropped 88 percent from a maximum of 19.9 per 100,000 population in 1911 to 2.3 in 1945. In the same period, the corresponding rate for nonwhites has declined 81.7 percent from 51.8 in 1910 to its minimum of 9.5 in 1944.

In 1910, the nonrespiratory forms of tuberculosis constituted 13.5 percent of all tuberculosis deaths among whites and 11.6 of those among nonwhites. Since that time the situation has been reversed. In 1945 the larger proportion was found for nonwhites, 9.6 percent, as compared with 7.0 for whites.

Deaths from respiratory and nonrespiratory tuberculosis by age, race, and sex.—In table 10 are given the numbers of deaths and corresponding death rates for respiratory and nonrespiratory tuberculosis by age, race, and sex for the United States in 1945. In general, the variations with age, race, and sex in the death rate for respiratory tuberculosis parallel rather closely those for tuberculosis (all forms) shown in figure 2.

TABLE 10.—*Death rates and number of deaths for tuberculosis of the respiratory system and for other forms, by age, race, and sex: United States, 1945*

Race and sex	All ages [1]	Under 5 years	5-9 years	10-14 years	15-19 years	20-24 years	25-29 years	30-34 years	35-44 years	45-54 years	55-64 years	65-74 years	75 yrs. and over
	Deaths from respiratory tuberculosis per 100,000 population												
All races, both sexes	37.0	4.0	1.3	3.3	19.0	46.1	49.6	43.6	47.0	55.2	62.7	69.8	69.2
Male	49.4	4.0	1.3	2.2	15.3	57.1	62.6	50.0	62.4	85.6	97.3	101.0	87.5
Female	26.0	4.0	1.2	4.4	22.3	40.8	42.5	38.3	32.6	24.6	27.3	40.1	53.4
White, both sexes	30.5	2.6	.7	1.6	10.3	28.8	34.4	32.1	37.5	47.8	58.2	67.1	68.2
Male	42.4	2.5	.8	1.1	8.3	37.2	45.4	36.2	50.5	75.1	91.5	96.8	85.4
Female	19.9	2.6	.7	2.2	12.1	24.9	28.6	28.7	25.2	20.4	24.1	39.2	53.3
Nonwhite, both sexes	92.3	14.3	4.6	14.7	82.0	169.5	165.7	139.0	131.8	131.5	120.8	108.4	82.0
Male	108.5	14.9	4.7	10.1	64.9	176.1	187.0	168.2	171.5	196.0	168.7	158.4	114.5
Female	77.9	13.8	4.5	19.3	97.4	165.5	153.2	115.7	96.7	67.9	68.6	54.8	54.2
	Deaths from nonrespiratory tuberculosis per 100,000 population												
All races, both sexes	3.1	6.1	1.5	1.2	2.1	3.6	3.2	2.8	2.8	3.0	3.3	3.7	4.5
Male	3.6	6.3	1.5	1.3	2.1	4.9	4.6	3.2	3.6	3.5	4.3	4.9	5.2
Female	2.6	6.0	1.5	1.1	2.2	2.9	2.4	2.4	2.0	2.4	2.3	2.7	3.9
White, both sexes	2.3	4.9	1.1	.8	1.1	2.0	1.9	1.8	1.9	2.4	2.9	3.5	4.5
Male	2.7	4.9	1.0	.8	1.2	2.8	2.5	2.1	2.4	2.8	3.8	4.5	5.2
Female	1.9	4.8	1.1	.7	1.0	1.6	1.6	1.5	1.3	2.0	1.9	2.5	3.9
Nonwhite, both sexes	9.8	15.2	4.1	4.3	9.8	14.8	12.9	11.1	10.9	9.2	8.5	7.4	4.1
Male	11.2	16.1	4.2	4.3	9.0	17.4	19.7	12.8	13.7	11.2	10.1	9.7	5.0
Female	8.6	14.3	4.1	4.3	10.6	13.2	8.9	9.7	8.4	7.2	6.7	5.0	3.4
	Number of deaths from respiratory tuberculosis												
All races, both sexes	48,879	527	143	348	2,056	4,157	4,472	4,492	8,979	9,037	7,583	4,911	2,128
Male	30,697	268	74	118	772	1,668	1,979	2,343	5,757	7,023	5,958	3,465	1,244
Female	18,182	259	69	230	1,284	2,489	2,493	2,149	3,222	2,014	1,625	1,446	884
White, both sexes	35,962	296	73	149	979	2,277	2,751	2,952	6,425	7,143	6,530	4,415	1,949
Male	23,556	148	38	50	368	931	1,259	1,517	4,198	5,621	5,191	3,090	1,129
Female	12,406	148	35	99	611	1,346	1,492	1,435	2,227	1,522	1,339	1,325	820
Nonwhite, both sexes	12,917	231	70	199	1,077	1,880	1,721	1,540	2,554	1,894	1,053	496	179
Male	7,141	120	36	68	404	737	720	826	1,559	1,402	767	375	115
Female	5,776	111	34	131	673	1,143	1,001	714	995	492	286	121	64
	Number of deaths from nonrespiratory tuberculosis												
All races, both sexes	4,037	805	168	128	232	321	287	284	529	484	398	263	138
Male	2,237	420	84	69	108	144	144	151	328	286	262	167	74
Female	1,800	385	84	59	124	177	143	133	201	198	136	96	64
White, both sexes	2,661	560	105	70	103	157	153	161	318	352	324	229	129
Male	1,499	290	52	40	52	71	68	88	203	206	216	144	69
Female	1,162	270	53	30	51	86	85	73	115	146	108	85	60
Nonwhite, both sexes	1,376	245	63	58	129	164	134	123	211	132	74	34	9
Male	738	130	32	29	56	73	76	63	125	80	46	23	5
Female	638	115	31	29	73	91	58	60	86	52	28	11	4

[1] Includes ages not stated.

In contrast with the death rate for respiratory tuberculosis which has its peak at ages over 20, the highest mortality from the nonrespiratory forms tends to occur in early childhood. For the total population under 5 years in 1945, the nonrespiratory tuberculosis death rate was 6.1 per 100,000 population, which is higher than that in any succeeding age group. From this maximum, the rate dropped to 1.2 in the age group 10–14, rose to a minor peak of 3.6 in the age group

20–24, and, after a slight decline, increased with advancing age to 4.5 in the age group 75 years and over. The variations upon this general pattern, which are found in the rates for white and nonwhite males and females, will be observed in figure 7.

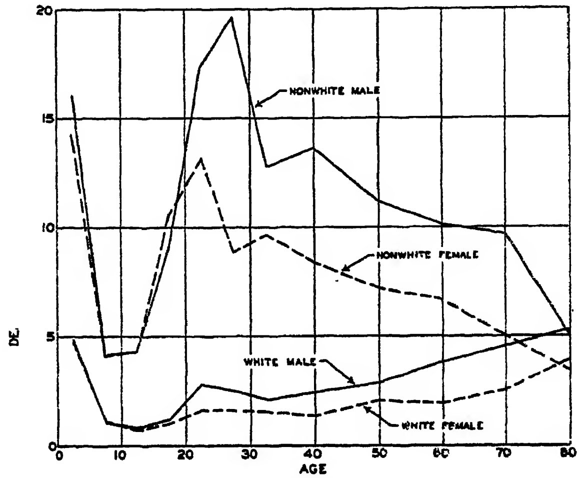

FIGURE 7.—Death rates for nonrespiratory tuberculosis by age, race, and sex: United States, 1945.

The nonrespiratory forms of tuberculosis play the major role in the total mortality from tuberculosis in early childhood. In 1945, in the age group under 5 years, the nonrespiratory forms constituted approximately two-thirds of the tuberculosis deaths among whites and approximately one-half of those among nonwhites.

Deaths from respiratory and nonrespiratory tuberculosis by States.—The respiratory tuberculosis death rates for the 48 States and the District of Columbia ranged in 1945 from 10.1 per 100,000 population for residents of Wyoming to 63.7 and 115.0 for residents of New Mexico and Arizona, respectively (table 11). The distribution of the respiratory tuberculosis death rates by States is very similar to that for tuberculosis (all forms) shown in figure 5.

The death rates for the nonrespiratory forms of tuberculosis varied from 0.8 per 100,000 population for residents of Wyoming to 8.4 for residents of New Mexico. The death rates for one-fourth of the States were less than 2.2 and for one-fourth were greater than 3.5.

The areas of high and low mortality from nonrespiratory tuberculosis are less clearly defined than those for tuberculosis of the respiratory system. In general, two areas of high mortality may be distinguished

TABLE 11.—*Number of deaths and death rates for tuberculosis of the respiratory system and for other forms by State: United States, 1945*

[By place of residence]

Area	Tuberculosis (all forms)	Tuberculosis of respiratory system	Tuberculosis (other forms)		Rate per 100,000 population	
			Number	Percent	Tuberculosis of respiratory system	Tuberculosis (other forms)
United States	52,916	48,879	4,037	7.6	37.0	3.1
Alabama	1,218	1,121	97	8.0	39.9	3.4
Arizona	776	725	51	6.6	115.0	8.1
Arkansas	817	770	47	5.8	43.3	2.6
California	3,827	3,526	301	7.9	40.0	3.4
Colorado	426	386	40	9.4	34.4	3.6
Connecticut	664	612	52	7.8	34.3	2.9
Delaware	109	93	16	14.7	32.4	5.6
District of Columbia	541	485	56	10.4	51.7	6.0
Florida	739	700	39	5.3	29.3	1.6
Georgia	1,108	1,008	100	9.0	31.6	3.1
Idaho	81	72	9	11.1	14.4	1.8
Illinois	3,184	2,916	268	8.4	37.8	3.5
Indiana	1,133	1,013	120	10.6	29.5	3.5
Iowa	355	328	27	7.6	14.5	1.2
Kansas	339	314	25	7.4	18.0	1.4
Kentucky	1,605	1,472	133	8.3	57.1	5.2
Louisiana	1,092	1,030	62	5.7	41.9	2.5
Maine	244	225	19	7.8	28.6	2.4
Maryland	1,267	1,168	99	7.8	55.0	4.7
Massachusetts	1,643	1,551	92	5.6	37.1	2.2
Michigan	1,816	1,652	164	9.0	30.2	3.0
Minnesota	621	563	58	9.3	22.5	2.3
Mississippi	720	682	38	5.3	32.8	1.8
Missouri	1,424	1,342	82	5.8	37.7	2.3
Montana	171	156	15	8.8	34.1	3.3
Nebraska	185	163	22	11.9	13.6	1.8
Nevada	89	80	9	10.1	50.1	5.6
New Hampshire	99	91	8	8.1	20.1	1.8
New Jersey	1,737	1,649	88	5.1	39.3	2.1
New Mexico	386	341	45	11.7	63.7	8.4
New York	6,032	5,593	439	7.3	44.4	3.5
North Carolina	1,262	1,159	103	8.2	33.1	2.9
North Dakota	117	108	9	7.7	20.7	1.7
Ohio	2,631	2,394	237	9.0	34.8	3.4
Oklahoma	830	781	49	5.9	38.4	2.4
Oregon	308	272	36	11.7	22.5	3.0
Pennsylvania	3,832	3,577	255	6.7	38.9	2.8
Rhode Island	252	235	17	6.7	31.0	2.2
South Carolina	663	616	47	7.1	32.3	2.5
South Dakota	156	138	18	11.5	24.8	3.2
Tennessee	1,776	1,652	124	7.0	57.4	4.3
Texas	2,966	2,789	177	6.0	41.1	2.6
Utah	79	69	10	12.7	11.2	1.6
Vermont	110	102	8	7.3	32.9	2.6
Virginia	1,366	1,235	131	9.6	40.1	4.3
Washington	706	618	88	12.5	29.6	4.2
West Virginia	719	663	56	7.8	38.4	3.2
Wisconsin	668	619	49	7.3	21.0	1.7
Wyoming	27	25	2	7.4	10.1	.8

(fig. 8). One is in the southwestern part of the country and in 1945 was composed of Nevada, Arizona, New Mexico, and Colorado; the other is east of the Mississippi and, in 1945, was composed of Kentucky, Tennessee, Virginia, Maryland, the District of Columbia, and Delaware.

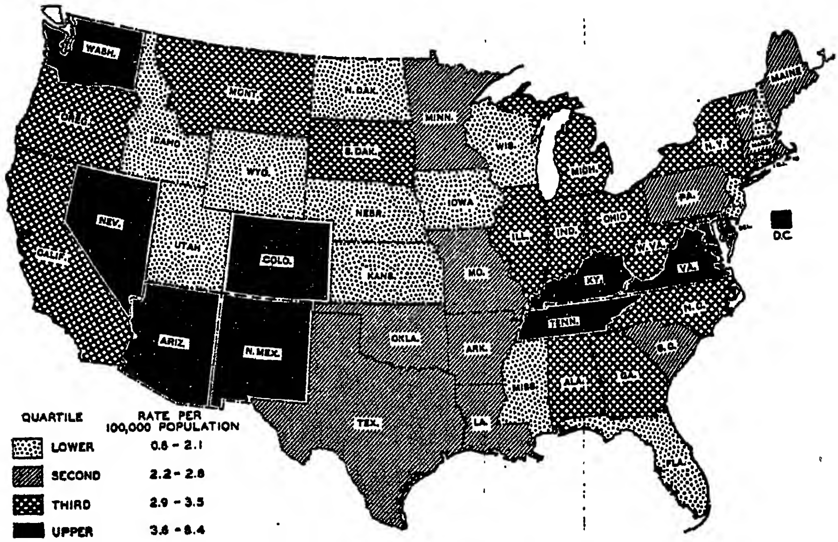

FIGURE 8.—Geographic distribution of the mortality from nonrespiratory forms of tuberculosis in the United States: 1945.

Without further detailed study, it is difficult to evaluate the significance of State-to-State variation of the death rate for nonrespiratory tuberculosis. A comparison of the map (fig. 8) with the map of death rates for tuberculosis (all forms) (fig. 5) shows that although there may be some correlation between the rates for tuberculosis of the respiratory system and those for other forms of tuberculosis, there are a number of striking differences. In fact, of the 11 States in which more than 10 percent of the tuberculosis deaths were from the nonrespiratory forms of the disease, 5 will be found to have relatively low rates (lower quartile) and 4 to have relatively high rates (upper quartile) for tuberculosis of the respiratory system.

SUMMARY

This report presents data on the numbers of deaths and the death rates for tuberculosis in the United States and in each State for 1945 with corresponding data for the war years, 1942–44, and for the prewar period, 1939–41.

There were 52,916 deaths from tuberculosis (all forms) in the United States in 1945. The death rate for tuberculosis was 40.1 per 100,000 population as compared with 41.3 for 1944. The death rates for white females and for nonwhites of both sexes continued to decline, whereas the rate for white males showed little change. The rate for nonwhites was higher than the rate for whites, and in both race groups the rates for males were higher than those for females. For all 4 race-sex groups, the tuberculosis death rates were found to increase with age from a minimum in childhood to a maximum at the adult age.

There were 4,437 deaths from tuberculosis among war veterans in 1945, 62.8 percent being among veterans of World War I and 31.4 percent, among veterans of World War II. The number of deaths among World War II veterans increased from 974 in 1944 to 1,394 in 1945.

The rates for the principal nonwhite racial groups in the United States ranged from 98.0 and 101.5 for Negroes and Japanese to 211.9 and 276.1 for Indians and Chinese.

The death rates for tuberculosis (all forms) for the 48 States and the District of Columbia ranged in 1945 from 10.9 per 100,000 population for residents of Wyoming to 72.1 and 123.1 for residents of New Mexico and Arizona, respectively. The rates for 11 States were higher in 1945 than in 1944 and those for 2 States were the same. The average annual rates for 7 States for the war years 1942–45 were higher than the corresponding average rates for the prewar period, 1939–41.

Approximately 92 percent of all tuberculosis deaths in 1945 were from tuberculosis of the respiratory system and nearly 8 percent were from the nonrespiratory forms of the disease. The proportion of nonrespiratory tuberculosis varied from 5.1 percent for residents of New Jersey to 14.7 percent for residents of Delaware. The death rates for nonrespiratory tuberculosis for the individual States ranged from 0.8 per 100,000 population for residents of Wyoming to 8.4 for residents of New Mexico.

Because of the changes which have occurred in the population during the war, it is difficult to evaluate the tuberculosis mortality problem for recent years. This is especially true of data for the individual States. However, for the country as a whole reference is made wherever possible to *de jure* death rates for tuberculosis. Including as they do data for the country's population serving in the armed forces overseas as well as data for the population in the continental United States, they are more comparable to rates for the prewar years.

ADAPTER FOR PROCESSING 70-MM. ROLL FILM IN OPEN TANKS

By A. J. Moen, *X-Ray Engineer, Tuberculosis Control Section, Washington State Department of Health*

Originally, 70-mm. film was of the green-sensitive type, necessitating development in total darkness. The present blue-sensitive film can be processed under the standard X-ray darkroom safelight. The miniature film tank for processing 70-mm., 100-foot roll film was designed for a total-darkness developing procedure, carried out in daylight after the film is placed on the developing spools in the darkroom. As such, the developing assembly made by the Fairchild Camera and Instrument Corporation is adequate for field work and occasional use; but with a large volume of work, an adaption by which the roll may be developed in the regular 10-gallon open tank has proved to be a time saver.

The device consists simply of a rack to hold the Fairchild film-developing spools and is made to fit over the standard 10-gallon tank. This rack can be fabricated of wood, but because of the danger of contaminating the developing solution by material absorbed by the wood, it should preferably be made from an alkaline- and acid-resistant stainless steel, or a plastic, such as acrylic resin (the common Lucite or Plexiglass). We preferred plastic because it is more easily worked.

The finished rack will have the appearance of a two-legged stool with a large hole in the top, as shown in the photograph (figure 1) and in part "A" of figure 2. The legs serve a double purpose:

1. To support the rolls on table or bench while winding the film from the camera spool to the developing spools.

2. To keep film rolls wound while transferring them from one tank to another.

To make the rack from Lucite or Plexiglass, cut the material to size with a band saw or jig saw and cement the pieces together with acrylic cement or glacial acetic acid. No pressure is required on the joints while cementing. Care should be exercised, however, in using the cementing medium, as it may dissolve the plastic. The plastic edges to be joined should be fairly smooth and straight to assure good bonding. The pieces should be placed together and the cementing liquid applied with an eyedropper, only enough cementing liquid being used to fill completely the space between the pieces. The cement will require a few minutes to set. The rack should not be used for twenty-four hours, thus making sure that the joints are firm.

A horseshoe-shaped piece of plastic (see figure 2, "B") to fit under the handles of the miniature developer tank will keep the spool assembly from falling through the hole in the rack. Two longer strips may be used under the rack to support it over the wash tank if the rack is larger than the 10-gallon tank.

A REVIEW[1] OF

REHABILITATION AND THE OPEN CASE[2]

The purpose of this article is to compare the results of two studies on rehabilitation of the tuberculous. The first study was reported by O. Düggeli under the title "The Fate of the Open Case: Investigations on Patients of the Thurgauisch-Schaffhausenschen Heilstätte [Sanatorium] in Davos during the Years 1922–1937."[3] The second was reported by L. E. Siltzbach—"Clinical Evaluation of the Rehabilitation of the Tuberculous"[4]—and concerns the fate of people discharged from the Altro Workshop in New York during the years 1915–1939.

Both authors base their conclusions on a comparison, by successive periods, of the life expectancy and the relapse rate of ex-patients. Both use sputum history as the main criterion and classify cases in similar categories of clinical status. Both arrive at almost identical conclusions as to the scope and general policy of rehabilitation. Brieger presents abstracts of the two reports, with all essential figures and several charts, and then compares results of the two surveys.

Düggeli and Siltzbach agree (1) that the introduction of collapse therapy has been of great importance in raising the number of potential recoveries; (2) that the majority of patients discharged as sputum-converted and arrested cases, and even some of the "good" chronic cases, require only temporary, part-time vocational therapy; and (3) that facilities for gainful employment of chronic infectious cases are practically nonexistent though urgently needed. Both reports recommend a clear-cut separation of recovering patients from those whose disease is progressive. The problem of rehabilitation is thus reduced to a simple formula: Reintroduction of the fit into normal industry and isolation of the unfit in "village settlements."

Brieger, after further analysis of the material, protests that there

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[1] From the Office of the Chief, Tuberculosis Control Division, Bureau of State Services, United States Public Health Service.

[2] By E. Brieger, Research Department at Papworth Village Settlement, England. Tubercle, XXVI (7–8): 115–126 (July–August 1945).

[3] Contra la Tuberculose, Annexe au Bulletin du service fédéral de l'hygiène publique. Nr. 1 (12 Février 1944).

[4] National Tuberculosis Association, New York, N. Y. (1944).

is no absolute line between the fit and unfit, at least in the first 4 years after discharge. The differentiation is a matter of time, and to the individual patient the use of this time is of decisive importance. He argues that all attempts to establish separate institutions for patients of different categories have met with failure, and warns against the revival of such a scheme. The alternative, he asserts, would be the creation of a composite unit with sections for treatment, training, and employment.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED MARCH 15, 1947

Summary

Of the total of 42,997 cases of influenza reported for the week (as compared with 21,991 last week and a 5-year median of 4,054), 41,406 cases, or 96 percent occurred in the West Central, South Atlantic, and Mountain areas. Of the net increase (21,006 cases), 62 percent occurred in the West South Central area (38 percent in Texas), 18 percent in the West North Central, and 16 percent in the South Atlantic. The 15 States reporting currently more than 200 cases (and aggregating 41,546 cases) are as follows (last week's figures in parentheses): *Increases*—Iowa 970 (205), Kansas 6,260 (3,395), Virginia 1,151 (520), West Virginia 2,099 (304), South Carolina 1,518 (504), Tennessee 341 (70), Alabama 328 (233), Arkansas 5,306 (952), Oklahoma 1,083 (272), Texas 19,527 (11,624), Arizona 394 (86); *decreases*—Indiana 275 (526), Missouri 208 (239), Georgia 482 (650), Colorado 1,604 (1,720). Although only 29 cases were officially reported in Kentucky during the current week, special surveys made in the State show 74,046 cases of upper respiratory infection in the past 2 weeks. A total of 105,579 influenza cases has been reported to date this year, as compared with 169,936 for the corresponding period last year and a 5-year median of 54,065.

The total of 33 cases of poliomyelitis for the current week, which is the average date of seasonal low incidence, is more than reported for any corresponding week of record (since 1927). The total for the 52 weeks ended with the current week is 25,400, as compared with 19,406 in the 1944–45 period, which was the largest of the corresponding figures of the past 5 years.

The total of 4,013 cases of typhoid fever reported for the 52-week period since the average date of the seasonal low week for that disease is lower than for the corresponding 52 weeks of any of the past 5 years.

Deaths recorded for the week in 93 large cities in the United States totaled 10,310, as compared with 10,206 last week, 9,267 and 9,622 for the corresponding weeks, respectively, of 1946 and 1945, and a 3-year (1944–46) median of 9,532. The cumulative total is 110,460, as compared with 113,546 for the corresponding period last year.

Telegraphic morbidity reports from State health officers for the week ended March 15, 1947, and comparison with corresponding week of 1946 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46
	Mar. 15, 1947	Mar. 16, 1946		Mar. 15, 1947	Mar. 16, 1946		Mar. 15, 1947	Mar. 16, 1946		Mar. 15, 1947	Mar. 16, 1946	
NEW ENGLAND												
Maine	0	3	2	------	3	------	186	61	61	1	1	2
New Hampshire	0	0	0	5	------	------	32	11	10	3	1	0
Vermont	0	0	0	------	9	1	283	13	15	0	0	0
Massachusetts	26	9	5	------	------	------	417	613	708	0	2	3
Rhode Island	1	0	0	------	1	------	196	9	14	0	2	2
Connecticut	0	0	0	------	3	3	566	164	407	0	5	5
MIDDLE ATLANTIC												
New York	10	9	21	[1] 9	[1] 4	[1] 6	319	3,437	2,321	8	19	36
New Jersey	7	4	3	6	7	13	558	2,090	1,366	0	4	7
Pennsylvania	13	16	10	3	5	3	367	3,035	1,258	6	8	16
EAST NORTH CENTRAL												
Ohio	7	28	7	91	16	20	731	412	412	2	8	8
Indiana	13	6	7	275	14	9	39	993	266	0	3	3
Illinois	6	34	8	55	22	22	44	1,925	963	5	12	18
Michigan [2]	8	13	8	26	7	6	74	3,318	555	4	12	7
Wisconsin	3	11	1	154	46	40	247	1,046	1,046	0	4	4
WEST NORTH CENTRAL												
Minnesota	6	10	4	------	3	2	65	49	94	7	4	3
Iowa	0	5	3	970	------	------	65	242	242	0	2	0
Missouri	13	7	6	208	1	3	15	516	375	4	2	7
North Dakota	5	0	1	95	4	1	6	20	64	0	0	1
South Dakota	1	0	0	18	------	------	15	29	29	0	0	0
Nebraska	2	4	3	178	24	11	5	256	249	1	0	0
Kansas	8	9	5	6,260	5	5	9	931	513	0	1	1
SOUTH ATLANTIC												
Delaware	1	0	1	------	------	------	1	24	17	0	0	0
Maryland [2]	7	10	10	3	12	5	19	373	373	2	8	9
District of Columbia	0	0	0	4	------	1	24	179	100	0	5	1
Virginia	8	16	7	1,151	300	382	332	463	463	2	12	12
West Virginia	1	3	3	2,099	4	40	80	61	66	1	3	3
North Carolina	8	15	8	------	------	14	400	389	389	3	6	6
South Carolina	2	4	4	1,518	376	449	79	316	257	1	1	1
Georgia	1	6	4	482	7	24	264	117	187	1	4	4
Florida	9	4	3	73	3	3	15	92	92	3	1	7
EAST SOUTH CENTRAL												
Kentucky	4	4	5	29	52	6	10	583	91	1	2	4
Tennessee	4	9	6	341	60	71	127	301	301	4	4	8
Alabama	8	3	6	328	168	168	88	216	226	5	5	5
Mississippi [2]	6	5	8	------	------	------	18	------	------	1	5	5
WEST SOUTH CENTRAL												
Arkansas	3	5	5	5,306	109	109	383	196	196	3	1	3
Louisiana	13	7	6	6	405	13	56	337	188	6	6	6
Oklahoma	3	3	6	1,083	88	190	7	156	88	1	1	2
Texas	25	41	41	19,527	1,949	1,228	309	1,310	1,310	9	13	13
MOUNTAIN												
Montana	2	1	2	193	26	26	147	23	87	1	1	0
Idaho	0	0	0	144	20	------	6	69	72	0	0	0
Wyoming	1	0	0	20	2	6	21	42	95	0	0	0
Colorado	5	6	6	1,604	39	39	46	445	350	2	0	0
New Mexico	1	0	1	3	1	1	45	7	20	0	1	1
Arizona	6	6	4	394	184	125	47	75	75	0	0	1
Utah [2]	0	0	0	67	7	7	22	635	155	0	0	1
Nevada	0	0	0	------	------	3	1	25	5	0	0	0
PACIFIC												
Washington	4	5	3	111	------	------	55	1,049	322	3	2	6
Oregon	1	0	4	125	17	25	33	288	167	1	1	2
California	15	24	23	33	51	59	217	2,871	2,094	8	14	27
Total	262	345	281	42,997	4,054	4,054	7,091	29,812	23,150	99	186	243
11 weeks	[4]3,233	4,243	3,441	105,579	169,936	54,065	56,072	152,241	158,612	938	2,233	2,791
Seasonal low week [3]	(27th) July 5–11			(30th) July 26–Aug. 1			(35th) Aug. 30–Sept. 5			(37th) Sept. 13–19		
Total since low	10,799	15,887	12,263	138,554	532,184	89,927	78,959	178,365	197,606	1,905	3,737	5,243

[1] New York City only.

[2] Period ended earlier than Saturday.

[3] Dates between which the approximate low week ends. The specific date will vary from year to year.

[4] Correction: Diphtheria, Ohio, week ended January 25, 16 cases (instead of 17).

Telegraphic morbidity reports from State health officers for the week ended March 15, 1947, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Poliomyelitis: Week ended— Mar. 15, 1947	Poliomyelitis: Week ended— Mar. 16, 1946	Poliomyelitis: Median 1942–46	Scarlet fever: Week ended— Mar. 15, 1947	Scarlet fever: Week ended— Mar. 16, 1946	Scarlet fever: Median 1942–46	Smallpox: Week ended— Mar. 15, 1947	Smallpox: Week ended— Mar. 16, 1946	Smallpox: Median 1942–46	Typhoid and paratyphoid fever [5]: Week ended— Mar. 15, 1947	Typhoid and paratyphoid fever [5]: Week ended— Mar. 16, 1946	Typhoid and paratyphoid fever [5]: Median 1942–46
NEW ENGLAND												
Maine	0	0	0	24	36	22	0	0	0	0	0	0
New Hampshire	0	0	0	17	11	11	0	0	0	0	0	0
Vermont	1	1	0	0	4	11	0	0	0	0	1	0
Massachusetts	2	0	0	134	230	403	0	0	0	5	1	1
Rhode Island	0	0	0	12	9	14	0	0	0	0	0	0
Connecticut	1	2	0	38	68	69	0	0	0	0	2	0
MIDDLE ATLANTIC												
New York	1	1	1	387	680	655	0	0	0	2	1	3
New Jersey	0	0	0	166	117	183	0	0	0	0	0	0
Pennsylvania	1	2	0	228	447	572	0	0	0	4	1	4
EAST NORTH CENTRAL												
Ohio	0	1	0	430	430	430	2	0	0	0	2	2
Indiana	0	0	0	158	82	153	1	1	1	3	1	1
Illinois	1	0	1	171	211	269	1	0	1	0	3	2
Michigan [2]	0	2	0	214	168	259	0	0	0	2	2	1
Wisconsin	1	0	1	110	160	245	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	2	0	0	49	64	93	0	0	0	1	0	0
Iowa	0	0	0	35	64	64	0	0	0	0	0	0
Missouri	0	1	1	23	44	134	0	1	1	1	0	1
North Dakota	1	0	0	23	16	32	0	0	0	0	0	0
South Dakota	0	0	0	7	21	21	0	0	0	0	0	0
Nebraska	0	0	0	31	49	50	0	0	0	0	0	0
Kansas	0	0	0	48	109	109	0	1	1	0	0	0
SOUTH ATLANTIC												
Delaware	0	0	0	21	6	16	0	0	0	0	0	0
Maryland [2]	1	0	0	38	106	112	0	0	0	1	1	1
District of Columbia	0	0	0	16	30	30	0	0	0	0	1	0
Virginia	0	2	0	49	141	93	0	0	0	0	1	2
West Virginia	0	0	0	26	38	41	0	0	0	4	1	2
North Carolina	0	0	0	29	54	45	0	1	0	0	1	1
South Carolina	0	0	0	17	8	8	0	0	0	1	1	1
Georgia	0	0	0	27	10	17	0	0	0	0	3	3
Florida	1	2	0	17	4	7	0	0	0	2	1	3
EAST SOUTH CENTRAL												
Kentucky	0	0	0	34	33	55	0	0	0	2	0	2
Tennessee	0	0	0	58	50	61	0	0	0	2	0	0
Alabama	1	0	0	20	52	22	0	0	0	1	2	1
Mississippi [2]	0	1	1	14	7	7	0	5	0	2	2	1
WEST SOUTH CENTRAL												
Arkansas	0	0	0	1	15	12	0	0	0	1	4	2
Louisiana	6	1	0	12	18	15	0	0	0	4	3	1
Oklahoma	0	0	0	21	17	21	0	0	0	0	0	1
Texas	1	0	1	53	71	71	0	4	4	2	7	6
MOUNTAIN												
Montana	0	2	0	4	11	23	0	0	0	0	0	0
Idaho	1	0	0	9	4	12	0	0	0	2	0	0
Wyoming	0	0	0	13	8	14	0	0	0	0	0	0
Colorado	0	0	0	64	23	71	1	0	0	0	4	0
New Mexico	1	0	0	8	14	14	0	0	0	0	0	0
Arizona	1	0	0	8	15	16	0	0	0	2	2	1
Utah [2]	0	0	0	17	12	41	0	0	0	0	0	0
Nevada	0	0	0	8	0	0	0	0	0	0	0	0
PACIFIC												
Washington	0	0	0	33	36	46	0	0	0	1	1	1
Oregon	0	1	0	40	16	16	0	0	0	0	0	0
California	9	4	4	167	205	205	0	0	0	3	3	4
Total	33	23	23	3,129	4,024	4,426	5	13	20	48	52	63
11 weeks	625	466	302	29,874	36,525	44,084	45	85	144	485	475	624
Seasonal low week [3]	(11th) Mar. 15–21			(32d) Aug. 9–15			(35th) Aug. 30–Sept. 5			(11th) Mar. 15–21		
Total since low	25,400	13,803	12,362	56,560	75,096	83,180	99	161	261	4,013	4,726	5,777

[2] Period ended earlier than Saturday.
[3] Dates between which the approximate low week ends. The specific date will vary from year to year.
[5] Including paratyphoid fever reported separately, as follows: Massachusetts 4 (salmonella infection); New York 1; Florida 1; Louisiana 1; California 1.

Telegraphic morbidity reports from State health officers for the week ended March 15, 1947, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Whooping cough: Week ended— Mar. 15, 1947	Whooping cough: Week ended— Mar. 16, 1946	Whooping cough: Median 1942–46	Week ended Mar. 15, 1947: Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis, infectious	Rocky Mt. spotted fever	Tularemia	Typhus fever, endemic	Undulant fever
NEW ENGLAND											
Maine	22	26	36								
New Hampshire	5		1								1
Vermont	6	18	23								2
Massachusetts	198	169	169	1	4		1				4
Rhode Island	10	30	34								
Connecticut	48	73	73								1
MIDDLE ATLANTIC											
New York	165	152	270	6	3		1				3
New Jersey	132	178	178	2							
Pennsylvania	242	72	205								4
EAST NORTH CENTRAL											
Ohio	147	65	116		1						4
Indiana	29	22	22				2		1		1
Illinois	73	88	88	6			1				6
Michigan [2]	281	97	120	2							12
Wisconsin	152	55	63						1		5
WEST NORTH CENTRAL											
Minnesota	8	10	25								4
Iowa	21	8	15	1							27
Missouri	9	3	10								1
North Dakota			1								
South Dakota	5	3	1			1					
Nebraska	2	3	10								
Kansas	21	20	37								2
SOUTH ATLANTIC											
Delaware	2	4	1								
Maryland [2]	90	23	42			1					1
District of Columbia	6	2	3								
Virginia	129	15	38			162					1
West Virginia	31	14	41								
North Carolina	64	64	127					1	1		
South Carolina	37	19	57	3	3				1	4	
Georgia	10	12	16	1	1				4	4	3
Florida	28	10	27	1						5	
EAST SOUTH CENTRAL											
Kentucky	30	38	38								
Tennessee	24	13	21						3	1	
Alabama	34	15	23							4	3
Mississippi [2]	16			1		1			3	5	2
WEST SOUTH CENTRAL											
Arkansas	19	1	10		1	52			1	2	
Louisiana	2	5	5	6					4	4	2
Oklahoma	16	14	15	1		1					
Texas	481	167	211	19	264	84				19	7
MOUNTAIN											
Montana	4	1	10				1				1
Idaho	2	5	3								1
Wyoming			2								
Colorado	8	3	27								2
New Mexico	12	9	9	1							
Arizona	12	34	31			15					
Utah [2]	17	9	20						1		1
Nevada											
PACIFIC											
Washington	51	32	32		1						1
Oregon	7	14	23								1
California	183	93	288	4	1		1		1		2
Total	2,891	1,708	2,709	55	279	317	7	1	21	48	105
Same week 1946	1,708			22	275	113	9	0	14	33	86
Median, 1942–46	2,709			27	152	52	9	0	13	34	[3] 78
11 weeks: 1947	27,919			504	3,740	2,536	74	10	438	508	1,112
1946	19,980			422	3,195	1,212	94	4	227	533	725
Median, 1942–46	26,139			293	2,268	700	94	4	218	533	[3] 824

[2] Period ended earlier than Saturday.
[3] 2-year average, 1945–46.

WEEKLY REPORTS FROM CITIES [1]

City reports for week ended March 8, 1947

This table lists the reports from 90 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0	------	0	------	0	1	0	3	0	0	4
New Hampshire:												
Concord	0	0	------	0	------	0	0	0	1	0	0	------
Vermont:												
Barre	0	0	------	0	13	0	0	0	0	0	0	1
Massachusetts:												
Boston	9	0	------	0	29	0	9	0	15	0	0	27
Fall River	0	0	------	0	12	0	3	0	1	0	0	------
Springfield	0	0	------	0	7	0	1	0	6	0	0	------
Worcester	0	0	------	0	1	0	8	0	5	0	0	16
Rhode Island:												
Providence	0	0	------	0	176	0	2	0	6	0	0	12
Connecticut:												
Bridgeport	0	0	------	0	11	0	1	0	1	0	0	------
Hartford	0	0	------	0	42	1	2	0	2	0	0	2
New Haven	0	0	------	0	29	0	0	0	4	0	0	4
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0	------	0	------	0	7	0	4	0	0	2
New York	8	1	3	1	112	3	82	2	136	0	0	49
Rochester	0	0	------	0	------	1	5	0	14	0	0	4
Syracuse	1	0	------	0	------	1	5	0	10	0	0	15
New Jersey:												
Camden	2	0	------	0	------	0	0	0	6	0	0	3
Newark	0	0	1	0	4	0	5	0	13	0	0	28
Trenton	0	0	------	0	27	0	2	0	10	0	0	1
Pennsylvania.												
Philadelphia	4	0	4	2	17	2	28	0	41	0	0	35
Pittsburgh	0	0	------	1	97	2	4	0	22	0	0	7
Reading	0	0	------	0	------	0	1	0	3	0	1	3
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	2	0	------	0	1	0	6	0	17	0	0	8
Cleveland	1	0	6	1	339	1	8	0	39	0	0	16
Columbus	0	0	------	0	9	0	1	0	6	0	0	7
Indiana:												
Fort Wayne	0	0	------	0	12	0	3	0	3	0	0	------
Indianapolis	1	1	------	1	4	0	3	0	21	0	0	20
South Bend	0	0	------	0	14	0	0	0	0	0	0	------
Terre Haute	1	0	------	0	1	0	2	0	1	0	0	------
Illinois:												
Chicago	0	0	------	1	21	2	37	0	58	0	1	35
Springfield	0	0	------	0	------	0	4	0	9	0	0	------
Michigan:												
Detroit	1	0	5	1	6	0	7	0	69	0	0	99
Flint	0	0	------	0	1	0	3	0	6	0	0	10
Grand Rapids	0	0	------	0	2	0	1	0	4	0	1	6
Wisconsin:												
Kenosha	0	0	------	0	------	0	0	0	1	0	0	6
Milwaukee	0	0	1	1	18	1	6	0	10	0	0	34
Racine	0	0	------	0	------	0	1	0	2	0	0	5
Superior	0	0	------	0	1	0	0	0	2	0	0	------
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0	------	0	------	0	0	0	2	0	0	3
Minneapolis	5	0	------	0	9	0	4	0	26	0	0	2
St. Paul	0	0	------	0	2	0	6	0	14	0	0	6
Missouri:												
Kansas City	0	0	18	2	2	0	14	0	14	0	0	1
St. Joseph	0	0	------	0	------	0	0	0	0	0	0	4
St. Louis	2	0	132	3	5	0	14	0	8	0	1	11

[1] In some instances the figures include nonresident cases.

City reports for week ended March 8, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
Nebraska:												
Omaha	0	0	------	2	------	0	4	0	0	0	0	------
Kansas:												
Topeka	0	0	------	0	2	0	0	0	2	0	0	------
Wichita	1	0	------	0	------	0	6	0	1	0	0	3
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0	------	0	------	0	1	0	4	0	1	1
Maryland:												
Baltimore	2	0	5	0	7	1	6	0	15	0	0	59
Cumberland	0	0	------	0	------	0	0	0	1	0	0	------
Frederick	0	0	------	0	1	0	0	0	1	0	0	------
District of Columbia:												
Washington	1	0	2	0	18	0	7	0	9	0	0	2
Virginia:												
Lynchburg	0	0	------	0	------	0	1	0	1	0	0	2
Richmond	0	0	------	0	70	2	0	0	2	0	0	1
Roanoke	0	0	------	0	------	0	0	0	7	0	0	------
West Virginia:												
Charleston	0	0	------	0	------	0	0	0	1	0	0	------
Wheeling	0	0	------	0	------	0	1	0	0	0	0	------
North Carolina:												
Raleigh	0	0	------	0	4	0	0	0	0	0	0	3
Wilmington	1	0	------	0	2	0	0	0	0	0	0	------
Winston-Salem	0	0	------	0	17	0	3	1	2	0	0	------
South Carolina:												
Charleston	0	0	22	0	5	0	0	0	0	0	0	1
Georgia:												
Atlanta	0	0	146	2	5	0	4	0	7	0	0	3
Brunswick	0	0	------	0	------	0	0	0	0	0	0	------
Savannah	0	0	3	1	61	0	0	0	0	0	0	------
Florida:												
Tampa	1	0	3	0	1	1	1	0	3	0	0	------
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	1	0	------	0	2	0	12	0	5	0	0	3
Nashville	0	0	------	0	------	0	7	0	7	0	0	2
Alabama:												
Birmingham	1	0	18	1	10	0	2	0	3	0	0	3
Mobile	2	0	7	1	10	1	2	0	2	0	0	------
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	------	0	------	0	1	0	0	0	0	7
Louisiana:												
New Orleans	0	0	------	0	31	0	13	1	3	0	0	------
Shreveport	0	0	------	2	------	0	6	1	2	0	0	------
Oklahoma:												
Oklahoma City	0	0	18	0	------	0	5	0	0	0	1	4
Texas:												
Dallas	0	0	------	0	10	0	1	0	4	0	0	11
Galveston	0	0	------	0	------	0	1	0	0	0	0	------
Houston	1	0	------	0	------	0	14	1	4	0	0	5
San Antonio	0	0	22	1	4	1	3	0	1	0	0	------
MOUNTAIN												
Montana:												
Billings	0	0	------	0	------	0	0	0	0	0	0	------
Great Falls	0	0	------	0	110	0	2	0	0	0	0	------
Helena	0	0	------	0	3	0	0	0	0	0	0	------
Missoula	0	0	------	0	------	0	0	0	0	0	0	4
Idaho:												
Boise	0	0	9	0	------	0	1	0	0	0	0	------
Colorado:												
Denver	3	0	31	3	25	0	15	0	25	0	0	1
Pueblo	0	0	------	0	------	0	4	0	7	0	0	------
Utah:												
Salt Lake City	0	0	------	0	2	0	1	0	3	0	0	------

City reports for week ended March 8, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
PACIFIC												
Washington:												
Seattle	1	0	------	0	2	0	6	0	8	0	0	1
Spokane	0	0	------	0	7	1	0	0	8	0	0	------
Tacoma	0	0	------	0	1	0	0	0	2	0	0	1
California:												
Los Angeles	6	0	3	0	4	1	4	1	18	0	0	23
Sacramento	0	0	------	0	1	0	2	0	1	0	0	2
San Francisco	1	0	------	0	16	2	6	0	12	0	1	------
Total	59	2	459	27	1,455	24	423	7	786	0	7	628
Corresponding week, 1946*	84	------	93	40	10,876	------	377	------	1,134	3	7	533
Average 1942-46*	68	------	169	[2] 37	[3] 5,701	------	[2] 456	------	1,701	1	10	723

[1] 3-year average, 1944-46.
[2] 5-year median, 1942-46.
* Exclusive of Oklahoma City.

Dysentery, amebic.—Cases: Boston 1; New York 4; Newark 2; Chicago 1; Detroit 2; St. Louis 1.
Dysentery, bacillary.—Cases: Chicago 1; New Orleans 1; Los Angeles 2.
Dysentery, unspecified.—Cases: Cincinnati 3; San Antonio 8.
Tularemia.—Cases: Memphis 1; Nashville 1.
Typhus fever, endemic.—Cases: Richmond 1; Brunswick 1; Memphis 1; Nashville 1.

Rates (annual basis) per 100,000 population, by geographic groups, for the 90 cities in the preceding table (latest available estimated population, 34,602,700)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza Case rates	Influenza Death rates	Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
New England	23.5	0.0	0.0	0.0	836	2.6	70.6	0.0	115	0.0	0.0	173
Middle Atlantic	6.9	0.5	3.7	1.9	119	4.2	64.3	0.9	120	0.0	0.5	68
East North Central	3.6	0.6	7.3	3.0	261	2.4	49.9	0.0	151	0.0	1.2	150
West North Central	16.1	0.0	301.7	14.1	40	0.0	96.5	0.0	135	0.0	2.0	60
South Atlantic	8.2	0.0	295.8	4.9	312	6.5	39.2	1.6	87	0.0	1.6	118
East South Central	23.6	0.0	147.5	11.8	130	5.9	135.7	0.0	100	0.0	0.0	47
West South Central	2.5	0.0	101.6	7.6	114	2.5	111.8	7.6	36	0.0	2.5	69
Mountain	23.8	0.0	317.7	23.8	1,112	0.0	182.7	0.0	278	0.0	0.0	40
Pacific	12.7	0.0	4.7	0.0	49	6.3	28.5	1.6	77	0.0	1.6	43
Total	8.9	0.3	69.4	4.1	220	3.6	64.7	1.1	119	0.0	1.1	95

TERRITORIES AND POSSESSIONS

Puerto Rico

Notifiable diseases—4 weeks ended February 22, 1947.—During the 4 weeks ended February 22, 1947, cases of certain notifiable diseases were reported in Puerto Rico as follows:

Disease	Cases	Disease	Cases
Chickenpox	33	Poliomyelitis	17
Diphtheria	63	Syphilis	108
Dysentery, unspecified	7	Tetanus	5
Gonorrhea	161	Tuberculosis (all forms)	829
Influenza	148	Typhoid and paratyphoid fever	25
Malaria	420	Typhus fever (murine)	4
Measles	2	Whooping cough	62

* * *

DEATHS DURING WEEK ENDED MAR. 8, 1947

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Mar. 8, 1947	Corresponding week, 1946
Data for 93 large cities of the United States:		
Total deaths	10,206	9,885
Median for 3 prior years	9,583	
Total deaths, first 10 weeks of year	100,149	104,279
Deaths under 1 year of age	856	601
Median for 3 prior years	601	
Deaths under 1 year of age, first 10 weeks of year	8,233	6,081
Data from industrial insurance companies:		
Policies in force	67,329,750	67,180,530
Number of death claims	12,818	14,660
Death claims per 1,000 policies in force, annual rate	9.9	11.4
Death claims per 1,000 policies, first 10 weeks of year, annual rate	9.8	11.3

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended February 22, 1947.—During the week ended February 22, 1947, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		45	2	296	460	21	27	79	72	1,002
Diphtheria		1		23	6	4	2		2	38
Dysentery:										
Amebic					2					2
Bacillary						1				1
German measles				21	71		5	8	5	110
Influenza		98			27				8	133
Measles		118	2	56	94	265	106	200	514	1,355
Mumps		4		94	533	33	172	7	255	1,098
Poliomyelitis				1	2					3
Scarlet fever		6	10	90	80	2		4	14	206
Tuberculosis (all forms)		11	7	83	28	11	19	19	55	233
Typhoid and paratyphoid fever				5	2	2				9
Undulant fever					2	1			1	4
Venereal diseases:										
Gonorrhea	2	26	29	101	106	41	28	30	75	438
Syphilis		19	12	79	83	13	16	2	45	269
Other forms									4	4
Whooping cough		8		34	139	11	5	2	28	227

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-named diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday of each month.

Plague

China—Fukien Province—Tsinkiang.—For the week ended January 4, 1947, 21 cases of plague with 12 deaths were reported in Tsinkiang, Fukien Province, China.

India—Cawnpore.—For the week ended March 1, 1947, 39 cases of plague were reported in Cawnpore, India.

Smallpox

Burma.—For the week ended February 22, 1947, 187 cases of smallpox with 59 deaths were reported in Burma. For the same period 103 cases of smallpox with 39 deaths were reported in Rangoon, Burma.

China—Shanghai.—For the week ended March 1, 1947, 66 cases of smallpox were reported in Shanghai, China.

France—Paris.—For the week ended March 8, 1947, 5 cases of smallpox were reported in Paris, France.

Typhus Fever

Panama (Republic).—For the month of February 1947, 11 cases of typhus fever were reported in the Republic of Panama.

FEDERAL SECURITY AGENCY

United States Public Health Service

Thomas Parran, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. St. J. Perrott, *Chief of Division*

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Effects of DDT Larvicides on Surface Organisms

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Public Health Reports

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EFFECTS OF DDT MOSQUITO LARVICIDING ON WILDLIFE

PART I. THE EFFECTS ON SURFACE ORGANISMS OF THE ROUTINE HAND APPLICATION OF DDT LARVICIDES FOR MOSQUITO CONTROL[1]

By CLARENCE M. TARZWELL, *Senior Assistant Sanitarian (R), United States Public Health Service*

This paper is the first of a series by the author and co-workers on the effects of DDT anopheline larviciding on wildlife. Subsequent parts dealing with other phases of the subject will appear at irregular intervals as the studies progress. Investigations of the effects on wildlife of the routine use of DDT as a mosquito larvicide were undertaken by the United States Public Health Service at the Carter Memorial Laboratory late in 1944. The purpose of these studies was to determine at what dosages and in what manner or physical state DDT could be routinely used as an anopheline larvicide without being significantly harmful to other organisms of economic or recreational value.

During the first year of the study, investigations were made on the effects of the routine hand application of DDT dusts, emulsions, and solutions. Experiments were carried on in 22 ponds, using several methods of application, types of larvicides, and dosages of DDT to determine their joint and individual effects on the fish life and the surface, bottom, and plankton organisms. DDT dusts were applied by means of several types of dusters, but air-pressure hand sprayers were generally used for the application of emulsions and solutions. DDT solutions were generally applied at the rate of ½ or 1 gallon per acre by means of an atomizing nozzle (*1*). It became apparent early in the study that tight emulsions and solutions applied at a rate of 0.4 pound, or more, of DDT per acre were detrimental to fish in shallow

[1] From Communicable Disease Center, Technical Development Division (Savannah, Ga.), States Relations Division.

water. Such methods and rates of application were therefore abandoned in favor of dusts or solutions applied at the rate of 0.1, 0.05 or 0.025 pound of DDT per acre. Individual treatments with these latter dosages caused no observed fish mortality. However, routine treatments at 0.1 pound per acre caused fish mortality between the third and tenth treatments. A series of 11 to 18 treatments at this rate significantly reduced the fish population in the ponds studied. Data secured to date indicate that, for small or shallow waters, routine treatments should not exceed 0.05 pound DDT per acre. Routine treatment at the rate of 0.05 pound per acre caused fish mortality in shallow ponds in which the entire area was treated. It is believed that in larger, deeper waters in which only the margins are treated, mortality will not be significant. Tests are to be made in such areas, using 0.05 pound of DDT routinely. No fish mortality was observed in areas routinely treated at 0.025 pound of DDT per acre.

During the second year (1945) of the investigation, emphasis was laid on a study of the effects of routine treatment at 0.1 pound DDT per acre, applied by airplane. Exhaust sprays or thermal aerosols and sprays from nozzles were the methods of application. Extensive areas on the Savannah River National Wildlife Refuge were treated in these studies. In addition to the effects on fish and fish food (surface, bottom, and plankton organisms), the investigations were expanded, in cooperation with the United States Fish and Wildlife Service, to include studies of the effects of routine treatment on amphibians, reptiles, birds, mammals, and terrestrial insects. Studies of these latter groups were confined to marginal areas into which there is driftage from treated areas.

During the third season, observations will be made in the Wildlife Refuge to determine the effects of 2 years of routine treatments on the fish population.

Investigations of the effects of the routine hand application of DDT mosquito larvicides on surface organisms other than mosquitoes were undertaken in April 1945. The purpose of these studies was to determine at what concentrations, and in what manner, DDT could be routinely used as an anopheline larvicide, without being significantly harmful to the surface organisms which are of importance as fish food and to wildlife in general. Experiments were conducted on more than 20 ponds, using several different formulae, methods of application, and concentrations of DDT.

PROCEDURE

All investigations were conducted on ponds in the vicinity of Savannah, Ga. Studies were made in three areas in the Savannah

River National Wildlife Refuge, on natural ponds, and on 14 artificial ponds at the Plant Introduction Laboratory of the Bureau of Plant Industry. Rotary hand dusters, atomizers, and air-pressure hand sprayers, equipped with several types of nozzles, were used for the application of the larvicidal materials. The larvicide was applied as a dust, a tight emulsion, a quick-breaking emulsion, and in solution. The forms most commonly used were a 1-percent-DDT dust in Electro FD No. 2 [2] and a solution of DDT in fuel oil, applied at the rate of 1 gallon or ½ gallon per acre. The dosages used varied from 2 pounds to 0.025 pound per acre, those most commonly used being 0.1 pound, 0.05 pound, and 0.025 pound per acre. Treatments were routine at weekly intervals.

Two methods were used for detecting kills or changes in the population of surface organisms due to the routine treatments. Gross observations were made 24 to 48 hours after treatment to detect any kill of the larger surface insect forms, such as Gyrinidae, Dytiscidae, Hydrophilidae and Corixidae, and quantitative surface samples were taken before and after treatment to determine any changes in the population of surface organisms due to individual treatments. During the first 2 to 4 weeks of treatment, quantitative samples were taken before and after each treatment, but thereafter they were taken at biweekly intervals. Samples were taken simultaneously in suitable check ponds.

Each surface sample represented the organisms from a surface area of 1 square foot to a depth of 2 inches. Thus, in taking each sample, about ⅙ cubic foot of water was strained. The samples were taken by means of the screen-dipper and strainer-pan technique, described by Hess and Tarzwell (*2*). This dipper (fig. 1) has a metal frame 4 inches square, a copper-wire-screen back and an adjustable handle. Since the dipper is 4 inches, or ⅓ foot, wide, pulling it over a distance of 3 feet sampled an area of 1 square foot, from which it strained out and retained all organisms larger than the wire-mesh openings. A mark was placed on the side of the dipper 2 inches above the bottom, so that all samples could be taken at the proper depth. The dipper was moved through the water at a slow uniform rate to allow all the water to pass through, while retaining the organisms. Water was collected in the strainer pan (fig. 2), and the contents of the dipper were washed into it by placing the back of the dipper in the water and then, by a backward motion, causing the water to pass through the screen in the reverse direction, thus washing the organisms out of the dipper and into the pan. The strainer pan was provided with the same mesh of screen as that on the dipper, so that

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[2] Electro FD No. 2 is a specially treated calcium-carbonate dust, manufactured by Calcium Carbonate Co., Chicago, Ill.

water collected in it would be free of those organisms retained in the dipper. After the contents of the dipper were washed into the strainer pan, they were then poured through a concentrator (fig. 3) to remove excess water. After the solid materials were sufficiently concentrated, the plug was removed from the concentrator and the contents were washed into a suitable container, by means of a wash bottle, and preserved for study. In the laboratory, the organisms in each sample were identified and counted by means of a binocular dissecting microscope. Square petri dishes, the bottoms of which were marked off in a grid, each square of which was the size of the microscope field, were used in making the counts. Prepared forms were used for recording the organisms found in each sample. All data were analyzed statistically to determine the significance of any changes due to treatment.

At the beginning of the study, 25 random samples were taken in a selected area before and after treatment. It soon became apparent, however, that large homogeneous areas suitable for such sampling did not occur in the ponds being studied, and that there was great variation in the numbers of organisms found in the various samples. In most instances this variation was so great that it would have been impossible to detect even large differences due to treatment. Random sampling was therefore abandoned in favor of paired samples. A method of sampling was adopted wherein 10 sampling stations were set up in each of the principal ponds being studied. These stations were marked by numbered stakes, and the richest areas were selected for the stations to insure a large number and variety of organisms in each sample. The stakes were so placed that environmental conditions were as nearly similar as possible on all sides of the stake, for a distance of at least 1 yard. The pretreatment samples were taken on the right side of the stake just previous to the application of the larvicide, and the posttreatment samples were taken on the left, 48 hours thereafter. Before treatment began, the adequacy of the sampling method was tested by comparing samples taken on the right and left sides of the stakes 48 hours apart. Differences between samples taken in this manner without treatment were not significant, indicating that the sampling technique was adequate. Samples were taken before and after the first two treatments and then at biweekly intervals, or at every other treatment. A consistent effort was made to reduce variation by rigidly controlling the sampling technique, so that differences due to the treatment might be detected. Student's t test was used for comparing the samples to determine the significance of the differences, and P values were used to denote levels of significance, a value of 0.05 or less being considered significant.

The above methods were used for determining the effects of indi-

FIGURE 1.—Taking a square-foot surface sample with the screen dipper. A yardstick is used to insure accuracy in the distance sampled.

FIGURE 2.—Collecting water in the strainer pan.

FIGURE 3.—Pouring the contents of the strainer pan through the concentrator.

vidual treatments. Residual or accumulative effects due to routine treatment were shown by comparing graphically the populations in the treated and check ponds throughout the season, or throughout the period of treatment.

RESULTS AND CONCLUSIONS

Tight or stable emulsions, formed by some organic solvent such as xylene, DDT, an emulsifier, and water, were found to be detrimental to aquatic organisms when sprayed on the water. Tight emulsions, when applied at dosages of 0.2 pound of DDT per acre, killed many aquatic insects and fish. For this reason, they were abandoned in favor of quick-breaking emulsions or solutions of DDT containing a spreading agent. Water emulsions were also abandoned in favor of solutions of DDT in fuel oil or kerosene, applied at the rate of 1 gallon per acre, because of the savings in labor. Thus 1-percent -DDT dusts and solutions of DDT in fuel oil with a spreader were used in most of the tests to determine the effects of DDT on the aquatic biota other than mosquitoes.

GROSS OBSERVATIONS

Gross observations were made at the time of treatment, and 24 and 48 hours after treatment, to note any kill of the larger forms. In shallow ponds having a sand bottom, individual treatments with fuel-oil solutions, at rates of 1 to 2 pounds of DDT per acre, killed aquatic hemipterons, beetles, dragonflies, damselflies, mayflies, chironomids, tadpoles, crayfish, and fish. Treatment with oil solutions, at dosages of 0.4 pound of DDT per acre also killed many of the aquatic forms, but a single treatment at this rate did not kill fish.

Treatments in all routine studies with fuel-oil and kerosene solutions of DDT were at dosages of 0.1, 0.05, and 0.025 pound per acre. Dusts were generally applied at the rate of 0.1 pound DDT per acre. Little or no kill was noted after individual and routine treatments with dust. From information now at hand, it appears that routine treatments with DDT dusts, in quantities sufficient to give adequate anopheline control, are not harmful to wildlife. Individual treatments with DDT solutions in fuel oil, applied at the rate of 1 or ½ gallon per acre and at the above dosages, gave kills of the following forms: Collembola, Corixidae, Notonectidae, Belostomatidae, Naucoridae, Gerridae, Haliplidae, Dytiscidae, Gyrinidae, Hydrophilidae, and Chironomidae. In general, the kills were more pronounced for the larger dosages. There were distinct kills at all dosages after several treatments, but for the first few treatments, very slight mortalities were noted at dosages of 0.025 pound of DDT per acre. The first treatment at 0.1 pound of DDT per acre gave significant kills of the larger

surface insects, and pronounced kills resulted from the second treatment, after which the observed number of dead organisms decreased. This was probably due to a marked reduction in the population due to the first two treatments. Surface forms were not eliminated, however, even by a series of 22 weekly treatments at 0.1 pound of DDT per acre.

Counts of the kill of surface organisms in a series of ponds 24 hours after the eleventh, twelfth and fourteenth treatments clearly show that surface forms were present in considerable abundance after routine treatments extending over a three-month period. The kill of the various forms in these ponds 24 hours after the eleventh, twelfth and fourteenth treatments are tabulated in table 1. These ponds were all about the same size, 5 by 15 feet. As indicated in table 1, a considerable number of aquatic and terrestrial forms were found dead in the ponds. It is probable that the terrestrial forms had been resting near the ponds and were killed at the time the ponds were treated, or that they later came in contact with the oil film containing the DDT. The latter is true for the Orthoptera, and the various adult Diptera and Odonata. The dragonfly and damselfly nymphs were very resistant to the DDT solutions sprayed on the surface of the ponds, but the adults were susceptible, and were killed in considerable numbers. A portion of these probably came to the water surface to lay eggs. In treatment of extensive areas, this kill might become important.

Dead adult chironomids were found on the water surface in great numbers, many of which were probably killed while attempting to emerge. In several instances, they were present in such large numbers that it was impractical to count them. In the counts made on these ponds, dead dytiscids and hydrophilids ranked next in abundance after chironomids. In the ponds treated at the rate of 0.1 pound of DDT per acre, the average kill per treatment, exclusive of chironomids, was 113 organisms, or 1.5 per square foot; in the ponds treated at the rate of 0.05 pound DDT per acre it was 10 organisms, or 0.13 per square foot; and in those treated at the rate of 0.025 pound per acre, the average kill was 35 organisms, or about 0.5 per square foot. Treatment with fuel oil alone, at the rate of 1 gallon per acre, resulted in an average kill for the three treatments of 12 organisms, exclusive of chironomids. The average number of dead insects found in the dusted pond was five, whereas the average for the check ponds was slightly more than two. These results indicate that treatment with dust at the rate of 0.1 pound of DDT per acre kills very few surface insects. The over-all results suggest that 0.05 pound and 0.025 pound of DDT per acre in fuel oil kills only a fraction as many surface forms as do applications at 0.1 pound per acre, and that fuel oil in itself kills numerous forms. It may be that 0.025 to 0.05 pound of DDT applied

TABLE 1.—*Summary of the kill of large surface and other organisms in 14 experimental ponds due to the use of DDT larvicides at specified dosages and times*

Organism	DDT in No. 2 fuel oil applied at the rate of ½ or 1 gallon per acre																								Fuel oil			Dust						None									Totals
	0.1 pound DDT per acre									0.05 pound DDT per acre						0.025 pound DDT per acre									1 gallon per acre			0.1 pound DDT per acre						Check ponds									
	Pond 1			Pond 8			Pond 17			Pond 13			Pond 16			Pond 7			Pond 14			Pond 15			Pond 6			Pond 2			Pond 12			Pond 5			Pond 10			Pond 11			
	Treatment No.																																												
	11	12	14	11	12	14	11	12	14	11	12	14	11	12	14	11	12	14	11	12	14	11	12	14	11	12	14	11	12	14	11	12	14	11	12	14	11	12	14	11	12	14	
Diplopoha			3																																								3
Collembola	2	1																1			1																						5
Orthoptera	1	1	2		1	2				1											1																						9
Ephemeroptera		12	8	1				9	5				1	1	1		4			2					1	3									3								51
Corixidae	2	10	2		2	1		9	2									3			1					1																	33
Notonectidae	1	5	7					1	4			1						1																									20
Belostomatidae																																		1									1
Naucoridae								3	2			1																															6
Vellidae																											1																1
Gerridae								1																																			1
Miridae			2	1																	1																						4
Lygaeidae		1																		1																							2
Saldidae					1												1																										2
Cercopidae	2	1	2					2																																			7
Cicadellidae		4	2	3	1		1		1							2	1	2	1		2						1							1									22
Fulgoridae		1							1						2			5																									9
Aphididae											1																2																3
Anisoptera	4		2	2			4	3	1		1	1	1		1	1			3	1		3			1			1	1					1	1								32
Zygoptera	2					3	5	2	8							2	1	3	1	1	1	2		1										1	3	2							38
Carabidae								1																						1													2
Haliplidae		1						9																																			10
Dytiscidae	11	124	35	4	40	9	8	100	76	1	7	4	1	10	3	2	27	15	7	17	4	3	9	7	1	3	1	2	2	4	1		1	2		1				1	1		634
Gryinidae			1																					1																			2
Hydrophilidae	9	62	12	3	27	8	7	56	21	1	1	2	1	3	1	13	16	8		17	4		8		1	3	1	1	1	4	1					1							288
Staphylinidae	1		3													3																											7
Meloidae																																								1			1
Helodidae								1																																			1
Scarabaeidae					1				1																																		2
Curculionidae																																	1										1
Ptilodactylidae		2																																									2
Tipulidae	1		3	1				2									2	1								1		1		1													13
Anisopidae					1											2																											3
Chironomidae	13	(1)	(1)	13	(1)	(1)	5	(1)	(1)		1	2	1	1	5	5	(2)	(2)	6	21	28	1	6		3	(2)	14			1			1		6	20	1		1				155+
Culicidae																														1													1
Bibionidae		2																																									2
Mycetophilidae																	1																										1
Tabanidae										1		1																															2
Stratiomyiidae									1																																		1
Dolichopodidae		3	1		3	5		1		1	1						4	2	1	2	2			1																			27
Acalyptrate Diptera		23	11	4	6	10	1	1	7	1		1			1	3	9	23	8	3	4			1			6									1							124
Syrphidae	2																																										2
Calyptrate Diptera																											2																2
Anthomyiids	1	1																																									2
Muscoids	3	3						1	1							2				1					1	1										1							14
Calliphoridae			1	1																																							2
Sarcophagidae																					1																						1
Lepidoptera		1					3		2				1		2							2		1																			12
Formicidae		3																	1								1			1													6
Vespidae																			1																								1
Apidae								1	1	1									1																								4
Arachnida		6	7		1	6	1		2	1		2				5	8	5	1	3	3	1			1	3				2													58
Totals less Chironomidae	42	267	164	20	84	44	30	292	136	8	11	13	5	14	11	35	74	69	25	48	25	11	12	12	6	15	15	5	4	14	2	0	2	6	7	6	0	0	0	2	1	0	1,477
Average kills per pond per treatment					113						10									35						12				4.5								2.4					

[1] Too numerous to count.
[2] Many.

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in 1 gallon of fuel oil per acre will kill considerably less insect life than the regular routine oiling at 15 to 40 gallons per acre which has been used for mosquito control in the past.

The surface forms found dead in the treated and check ponds at the Wildlife Refuge after the eighteenth treatment are summarized in table 2. These results also indicate that oil solutions cause a con-

TABLE 2.—*Summary of the kill of surface forms by the eighteenth routine larvicidal treatment at the Wildlife Refuge*

Organism	Pond 1 DDT in fuel oil—0.05 pound per acre Eighteenth treatment	Pond 2 DDT dust—0.1 pound per acre Eighteenth treatment	Pond 3 No treatment—Check Eighteenth treatment	Organism	Pond 1 DDT in fuel oil—0.05 pound per acre Eighteenth treatment	Pond 2 DDT dust 0.1—pound per acre Eighteenth treatment	Pond 3 No treatment—Check Eighteenth treatment
Diplopoda				Ptilodactylidae			
Collembola				Tipulidae			
Orthoptera				Anisopidae			
Ephemeroptera				Chironomidae	(1)		
Corixidae	219	2		Culicidae			
Notonectidae				Bibionidae			
Belostomatidae				Mycetophilidae			
Nepidae	1			Tabanidae			
Veliidae	1			Stratiomyiidae			
Gerridae				Dolichopodidae	1		
Miridae				Acalyptrate Diptera	2		
Lygaeidae	3			Syrphidae			
Saldidae				Calyptrate Diptera			
Cercopidae				Anthomyiids			
Cicadellidae		1		Muscoids			
Fulgoridae				Calliphoridae			
Aphididae	1			Sarcophagidae	1		
Anisoptera				Sciaridae			
Zygoptera	5			Empididae			
Carabidae				Trypetidae			
Haliplidae	5			Lepidoptera	2		
Dytiscidae	77	2		Trichoptera	4		
Gyrinidae				Vespidae			
Hydrophilidae	3			Apidae			
Staphylinidae				Chalcididae	1		
Meloidae				Arachnida	3		
Helodidae							
Scarabaeidae				Totals	329	5	0
Curculionidae							

1 Too numerous to count.

siderable kill, whereas the dust has little effect. They further indicate that although each treatment kills a considerable number of surface forms, it does not exterminate them, for there was a marked kill after the eighteenth treatment. The apparently large kill at 0.05 pound of DDT per acre in the refuge pond is due to the fact that this pond is many times larger than those dealt with in table 1.

The mortalities of organisms noted after the fifth and seventh treatments on three ponds in the Camp Stewart area are tabulated in table 3. Average mortalities per treatment were 258 organisms for 0.1 pound DDT per acre and 81 organisms for 0.05 pound. Two dead

TABLE 3.—*Kill of surface organisms 24 hours after the routine fifth and seventh treatments in experimental ponds at Camp Stewart*

Organism	Check—No treatment		DDT in kerosene			
			0.1 pound DDT		0.05 pound DDT	
	Pond 11		Pond 12		Pond 13	
	Treatment No.		Treatment No.		Treatment No.	
	5	7	5	7	5	7
Ephemeroptera			3	11		2
Corixidae			4	32		6
Notonectidae				1	1	
Belostomatidae			3		2	
Gerridae			1	1		
Miridae				3		1
Cercopidae				2		2
Cicadellidae				2		
Fulgoridae				4		
Aphididae				1		1
Anisoptera		3	2	16		3
Zygoptera				31		1
Dytiscidae			135	107	72	23
Gyrinidae			106	16	13	2
Hydrophilidae			18	5	15	10
Tipulidae				1		1
Chironomidae		1	(1)	(2)	(3)	3
Stratiomyiidae				1		
Acalyptrate Diptera						2
Sciaridae				1		
Empididae				1		
Trypetidae						1
Lepidoptera				2		
Trichoptera				4		
Formicidae						1
Arachnida				1		
Totals less Chironomidae	0	3	272	243	103	56

[1] Many.
[2] Too numerous to count.
[3] A few.

organisms were found in the check pond. Forms most prominent in the kill were the same as those found in the other ponds, namely, Dytiscidae, Gyrinidae, Hydrophilidae, Corixidae, and adult Anisoptera and Zygoptera.

Several series of studies were made to determine the relative effect of various solvents when used alone. It was found that kerosene was less toxic than fuel oil and that alcohol, acetone, and Aro-sol [3] killed very few insects. However, when combined with DDT, which is much more toxic than any of the solvents tested, indications are that the effect of the solvent is masked and that mortalities resulting from the various DDT solutions do not differ significantly. This phase of the problem needs more study, especially on those solvents which evaporate quickly, or which may affect final distribution of the DDT. When used alone, at the rate of 2 gallons per acre, fuel oil and Velsicol NR-70 [4]

[3] Aro-sol is a methylated naphthalene product of the Sun Oil Co., Philadelphia, Pa.
[4] Velsicol NR-70 is a tetramethyl naphthalene manufactured by the Velsicol Corp. of Chicago, Ill.

caused a considerable kill of surface insects. Velsicol gave a distinct scumlike film and was the most toxic solvent tested.

QUANTITATIVE SURFACE SAMPLES

Square-foot surface samples were taken in a number of treated and check ponds to determine the effect of individual treatments with DDT larvicides on surface organisms. In each group or series of ponds, samples were taken from both treated and check ponds on the same day so that conditions would be comparable. Thus, for each series of samples taken before and after treatment from the sprayed areas, similar series were taken from the check area, with the usual 48-hour interval between samplings. Both permanent and temporary watered areas were studied in this manner.

Test ponds 1, 2, and 3 were permanent water areas at the Savannah Migratory Waterfowl Refuge. Pond 1 was routinely treated with a DDT-fuel-oil solution at the rate of 0.05 pound of DDT and 1 gallon of fuel oil per acre. Pond 2 was dusted at the rate of 0.1 pound of DDT per acre, and pond 3 was an untreated check for the other two ponds. The DDT-fuel-oil solution proved much more toxic to the surface Hemiptera and Coleoptera than the DDT-pyrophyllite dust mixture. Changes in the population of surface organisms in pond 1, due to the individual applications, as indicated by the 190 quantitative surface samples taken during the period of treatment, are summarized in table 4. Samples were taken before and after the first, second, fourth, sixth, eighth, tenth, eleventh, thirteenth, and fifteenth treatments, and after the seventeenth in each of the ponds. The total number of the various organisms found in the 10 samples taken before and after the indicated treatments are shown in table 4, as well as the mean difference of the number taken before and after treatment. A decrease in the number of organisms found after treatment is indicated by a minus sign, and a significant change by an asterisk. Few significant changes were noted in the population of surface organisms due to individual treatments, and most of those which did occur were not consistent.

Pond 2 was treated with a 1-percent-DDT dust in pyrophyllite at the rate of 0.1 pound of DDT per acre, but demonstrated less damage than pond 1, treated with 0.05 pound of DDT in fuel oil. A total of 190 square-foot surface samples were taken in this pond. The organisms taken in these samples are tabulated in table 5. Only one significant decrease in the total number of organisms was found. Changes in the numbers of organisms in the different groups were not consistent and are therefore not considered important.

The check pond, number 3, showed two significant changes in the total number of organisms found. The samples collected on Sep-

TABLE 4.—*Changes in the population of surface organisms in test pond 1, due to routine weekly treatments at the rate of 0.05 pound of DDT and 1 gallon of fuel oil per acre, as indicated by quantitative square-foot surface samples taken just before, and 48 hours after, designated treatments*

Organism	First treatment (July 7, 1945)			Second treatment (July 17, 1945)			Fourth treatment (July 31, 1945)		
	Number of paired samples								
	10			10			10		
	Number of organisms		Mean difference and its standard error	Number of organisms		Mean difference and its standard error	Number of organisms		Mean difference and its standard error
	Before	After		Before	After		Before	After	
Hydra	0	2		17	31		4	4	
Turbellaria	2	0		23	20		6	2	
Nematoda	2,418	2,613	19.5± 99	2,380	3,346	96.6± 53.0	2,949	2,479	−47.0± 50.3
Rotatoria	98	97		180	292	11.2± 8.4	137	86	−5.1± 3.4
Bryozoa	0	0		0	0		0	0	
Oligochaeta	348	147	[1] −20.1± 7	663	766	10.3± 19.5	2,469	2,327	−14.2± 65.3
Hirudinea	1	0		1	3		0	0	
Cladocera	1,158	1,174	1.6± 19	1,703	2,073	37.0± 70.0	2,610	469	[2] −214.1± 62.2
Copepoda	930	1,018	8.8± 13	1,114	1,391	27.7± 30.0	1,236	639	[1] − 59.7± 21.8
Ostracoda	1,161	1,056	−10.5± 41	842	1,182	34.0± 22.3	915	543	−37.2± 20.6
Amphipoda	4	0		6	2		0	1	
Isopoda	0	2		2	4		0	0	
Palaemonetes	0	0		0	0		0	0	
Hydracarina	64	66		38	90	5.2± 2.8	63	14	[1] −4.9± 1.7
Collembola	0	8		3	2		0	4	
Ephemeroptera	19	19		26	43	1.7± 1.6	26	10	−1.6± .8
Anisoptera	8	6		5	17	[1] 1.2± .5	8	9	
Zygoptera	9	12		10	21	1.1± .8	14	11	
Hemiptera	17	8		7	5		5	6	
Coleoptera	6	3		9	12		10	1	[1] −.9± .4
Trichoptera	13	7		13	16		7	2	
Lepidoptera	5	6		2	2		0	1	
Culicini	0	0		2	0		0	0	
Anopheles	0	0		0	0		0	0	
Chironomidae	214	179	−3.5± 6.4	106	98	−.8± 2.9	158	90	−6.8± 11.6
Other Diptera	5	8		1	4		3	12	.9± 1.0
Gastropoda	3	4		1	3		4	3	
Total	6,483	6,435	−4.8±163	7,154	9,423	226.9±139.0	10,624	6,713	−391.0±189.3

[1] Exceeds 5-percent level of significance.

[2] Exceeds 1-percent level of significance.

TABLE 4.—*Changes in the population of surface organisms in test pond 1, due to routine weekly treatments at the rate of 0.05 pound of DDT and 1 gallon of fuel oil per acre, as indicated by quantitative square-foot surface samples taken just before, and 48 hours after, designated treatments*—Continued

Organism	Sixth treatment (Aug. 14, 1945)			Eighth treatment (Aug. 29, 1945)			Tenth treatment (Sept. 11, 1945)		
	Number of paired samples								
	10			10			10		
	Number of organisms		Mean difference and its standard error	Number of organisms		Mean difference and its standard error	Number of organisms		Mean difference and its standard error
	Before	After		Before	After		Before	After	
Hydra	10	13		8	12		3	6	
Turbellaria	2	3		11	6		22	14	
Nematoda	5,358	5,850	49.2±172.3	9,275	7,396	−187.9±188.1	[3]	[3]	
Rotatoria	275	228	−4.7± 9.0	148	211	6.3± 3.9	124	105	−1.9± 4.1
Bryozoa									
Oligochaeta	6,200	6,564	36.4±276.6	5,496	3,854	−164.2±139.0	10,001	4,467	−553.4±308.3
Hirudinea									
Cladocera	1,910	4,511	[2] 260.1± 56.2	4,550	4,666	11.6± 65.8	3,553	2,109	−144.4± 97.7
Copepoda	1,922	3,038	[2] 111.6± 28.4	2,065	3,183	[1] 111.8± 47.4	2,427	1,655	−77.2± 80.8
Ostracoda	328	317	−1.1± 5.9	212	251	3.9± 5.0	327	152	−17.5± 9.0
Amphipoda									
Isopoda	3	1							
Palaemonetes									
Hydracarina	20	31		103	116	1.3± 3.7	452	262	−19.0± 8.6
Collembola	5	2		33	22	−1.1± 1.5	2	0	
Ephemeroptera	11	10		34	28	−.6± 1.1	101	31	−7.0± 5.3
Anisoptera	21	21		51	28	−2.3± 1.3	62	22	[1] −4.0± 1.7
Zygoptera	9	19	1.0± .6	30	19	−1.1± 1.4	19	13	
Hemiptera	4	2		5	2		3	0	
Coleoptera	4	4		14	5	−.9± .5	11	4	
Trichoptera	1	1							
Lepidoptera				0	1				
Culicini				1	1		1	0	
Anopheles									
Chironomidae	20	38	1.8± 1.6	281	286		751	216	−53.5± 25.1
Other Diptera	1	6		25	27		299	193	−10.6± 9.2
Gastropoda	3	9		6	4		1	0	
Totals	16,107	20,668	456.1±480.5	22,348	20,118	−223.0±351.0	18,159	9,249	−891.0±499.0

[1] Exceeds 5-percent level of significance.
[2] Exceeds 1-percent level of significance.
[3] Not counted.

TABLE 4.—*Changes in the population of surface organisms in test pond 1, due to routine weekly treatments at the rate of 0.05 pound of DDT and 1 gallon of fuel oil per acre, as indicated by quantitative square-foot surface samples taken just before, and 48 hours after, designated treatments*—Continued

Organism	Eleventh treatment (Sept. 18, 1945)			Thirteenth treatment (Oct. 3, 1945)			Fifteenth treatment (Oct. 17, 1945)		
	Number of paired samples								
	10			10			10		
	Number of organisms		Mean difference and its standard error	Number of organisms		Mean difference and its standard error	Number of organisms		Mean difference and its standard error
	Before	After		Before	After		Before	After	
Hydra	14	15		19	25		17	9	−0.8± 0.9
Turbellaria	19	23	0.4± 1.6	11	11		16	0	−1.6± 1.1
Nematoda	(3)	(3)		(3)	(3)		(3)	(3)	
Rotatoria	71	121	5.0± 2.9	108	71	−3.7± 3.6	10	6	
Bryozoa									
Oligochaeta	3,391	5,683	229.2±188.4	2,014	3,577	156.3±103.0	4,814	858	−395.6±223.2
Hirudinea									
Cladocera	1,275	2,900	162.5± 78.1	1,728	2,262	53.4± 50.3	1,321	676	[1]−64.5± 26.4
Copepoda	1,044	3,081	203.7± 80.3	1,682	2,657	[1]97.5± 39.9	2,508	1,297	[2]−121.1± 36.0
Ostracoda	387	527	14.0± 18.6	586	419	−16.7± 18.4	330	112	[1]−21.8± 8.5
Amphipoda									
Isopoda									
Palaemonetes									
Hydracarina	82	231	14.9± 7.8	108	198	9.0± 4.5	170	194	2.4± 2.6
Collembola	8	22	1.4± 1.4	19	21		2	6	
Ephemeroptera	142	147	.5± 5.6	222	128	−9.4± 6.9	63	13	−5.0± 2.3
Anisoptera	52	46	−.6± 2.9	26	49	2.3± 1.8	34	7	−2.7± 1.8
Zygoptera	6	39	3.3± 3.4	31	38		22	5	−1.7± .8
Hemiptera	3	5		2	5		0	1	
Coleoptera	22	19	−.3± 4.4	11	7		6	2	
Trichoptera				0	1				
Lepidoptera	1	1							
Culicini									
Anopheles				1	0				
Chironomidae	246	274	2.8± 10.7	199	203		42	22	−2.0± 1.8
Other Diptera	361	327	−3.4± 9.2	55	66		27	11	−1.6± .9
Gastropoda	12	6	−.6± .5	0	3		14	9	
Total	7,136	13,467	633.1±358.5	6,822	9,741	291.9±179.2	9,396	3,228	[1]−616.8±258.4

[1] Exceeds 5-percent level of significance. [2] Exceeds 1-percent level of significance. [3] Not counted.

Table 5.—*Changes in the population of surface organisms in pond 2, due to routine weekly dusting with DDT at the rate of 0.1 pound per acre as indicated by quantitative surface samples taken just before, and 48 hours after, alternate treatments*

Organism	First treatment (July 9, 1945)			Second treatment (July 17, 1945)			Fourth treatment (July 31, 1945)		
	Number of paired samples								
	10			10			10		
	Number of organisms		Mean difference and its standard error	Number of organisms		Mean difference and its standard error	Number of organisms		Mean difference and its standard error
	Before	After		Before	After		Before	After	
Hydra	4	10		57	62		2	5	
Turbellaria	1	15	1.4± 0.9	17	39	2.2± 2.5	11	16	
Nematoda	1,133	1,268	13.5± 82.0	1,298	1,820	52.2± 58.0	1,625	1,921	29.6± 45.7
Rotatoria	148	203	5.5± 7.2	235	414	17.9± 11.0	218	112	−10.6± 7.3
Oligochaeta	95	255	16.0± 13.8	483	571	8.8± 14.5	2,188	1,442	−74.6±115.4
Hirudinea	0	0		3	2		1	0	
Cladocera	784	735	−4.9± 20.4	836	760	−7.6± 24.0	1,052	1,588	[1]53.6± 21.4
Copepoda	545	515	−3.0± 15.3	474	582	10.8± 10.0	710	349	−36.1± 22.5
Ostracoda	709	727		1,200	1,443	24.3± 64.0	1,148	743	−40.5± 25.2
Amphipoda	3	5		5	4		2	3	
Palaemonetes	1	0					2	0	
Hydracarina	372	19	−35.3± 16.8	52	47	−.5± 2.0	28	69	[1]4.1± 1.4
Collembola	19	5	−1.4± 1.3	2	2		13	13	
Ephemeroptera	18	26		22	26		48	60	1.2± .9
Anisoptera	3	10	.7± .5	4	0		5	6	
Zygoptera	8	4		14	8		14	10	
Hemiptera	16	17		7	7		6	15	
Coleoptera	5	7		10	9		32	23	
Trichoptera	11	12		3	6		1	5	
Lepidoptera	4	5		2	2		0	2	
Culicini	0	0		0	0		1	3	
Chironomidae	73	67		73	49	−2.4± 1.5	69	112	4.3± 3.2
Other Diptera	4	11		5	2		8	8	
Gastropoda	2	0		1	0		4	3	
Total	3,958	3,916	−4.2±127.0	4,803	5,855	105.2±146.0	7,188	6,508	−68.0±174.3

TABLE 5.—*Changes in the population of surface organisms in pond 2, due to routine weekly dusting with DDT at the rate of 0.1 pound per acre as indicated by quantitative surface samples taken just before, and 48 hours after, alternate treatments*—Continued

Organism	Sixth treatment (Aug. 14, 1945)			Eighth treatment (Aug. 29, 1945)			Tenth treatment (Sept. 11, 1945)		
	Number of paired samples								
	10			10			10		
	Number of organisms		Mean difference and its standard error	Number of organisms		Mean difference and its standard error	Number of organisms		Mean difference and its standard error
	Before	After		Before	After		Before	After	
Hydra	13	14		5	5		11	8	
Turbellaria	25	2	[1]—2.3± 0.9	41	7	[1]—3.4± 1.5	23	20	
Nematoda	6,660	2,641	[1]—401.9±178.1	Not counted			Not counted.		
Rotatoria	409	107	—30.2± 23.0	471	289	[1]—18.2± 7.9	56	26	—3.0± 2.0
Oligochaeta	6,071	3,127	[1]—294.4±105.0	8,243	3,836	—440.7±209.1	5,963	2,701	[1]—326.2±139.7
Hirudinea	0	0		0	0		4	0	
Cladocera	3,848	1,597	[2]—225.1± 62.5	4,598	3,777	—82.1± 80.9	2,426	1,463	—96.3± 70.4
Copepoda	1,078	855	—22.3± 13.6	1,332	1,114	[1]—21.8± 8.4	843	830	—1.3± 12.9
Ostracoda	296	182	—11.4± 8.4	152	239	8.7± 4.9	647	326	—32.1± 24.7
Isopoda	1	0		0	0		0	0	
Palaemonetes	1	0		0	0		0	0	
Hydracarina	95	25	[1]—7.0± 2.8	65	42	—2.3± 1.8	189	167	—2.2± 5.4
Collembola	26	12	—1.4± 1.1	14	61	4.7± 3.2	2	6	
Ephemeroptera	89	31	[1]—5.8± 2.2	25	41	1.6± 1.7	109	47	—6.2± 4.3
Anisoptera	13	14		28	23		23	14	—0.9± .5
Zygoptera	13	10		23	9	—1.4± .7	13	16	
Hemiptera	7	6		6	6		15	11	
Coleoptera	28	19		40	14	—2.6± 1.3	56	40	—1.6± 1.1
Trichoptera	4	0		1	0		1	1	
Lepidoptera	3	2		1	16	[1]1.5± .5	0	1	
Culicini	4	0		2	0		2	1	
Anopheles	0	0		0	2		2	0	
Chironomidae	314	181	—13.3± 8.2	898	572	—32.6± 25.9	850	735	—11.5± 23.3
Other Diptera	32	14		33	55	2.2± 2.1	190	467	27.7± 25.5
Gastropoda	2	6		3	1		2	1	
Total	19,032	8,845	[1]—1,018.7±317.0	15,981	10,109	—587.2±263.9	11,427	6,881	[1]—454.6±195.4

[1] Exceeds 5-percent level of significance. [2] Exceeds 1-percent level of significance.

TABLE 5.—*Changes in the population of surface organisms in pond 2, due to routine weekly dusting with DDT at the rate of 0.1 pound per acre as indicated by quantitative surface samples taken just before, and 48 hours after, alternate treatments*—Continued

Organism	Eleventh treatment (Sept. 18, 1945)			Thirteenth treatment (Oct. 4, 1945)			Fifteenth treatment (Oct. 17, 1945)		
	Number of paired samples								
	10			10			10		
	Number of organisms		Mean difference and its standard error	Number of organisms		Mean difference and its standard error	Number of organisms		Mean difference and its standard error
	Before	After		Before	After		Before	After	
Hydra	29	29		69	18	[1] −5.1± 1.7	12	2	−1.0± 0.6
Turbellaria	52	63	1.1± 3.2	93	21	−7.2± 3.7	21	1	−2.0± 1.4
Nematoda	Not counted			Not counted			Not counted		
Rotatoria	11	37	2.6± 1.6	138	168	3.0± 9.2	25	18	
Bryozoa	1	0		0	0		0	0	
Oligochaeta	1,864	2,034	17.0± 91.4	2,987	953	[1] 203.4± 74.8	2,357	294	−206.3±108.2
Cladocera	673	1,234	56.1± 27.5	2,377	2,117	−26.0± 37.9	990	357	[1] −63.3± 20.6
Copepoda	649	1,255	[2] 60.6± 13.6	1,185	1,891	70.6± 40.4	1,456	987	−46.9± 30.6
Ostracoda	248	410	16.2± 10.0	920	856	−6.4± 28.4	468	132	−33.6± 15.4
Hydracarina	54	109	[1] 5.5± 1.8	99	279	[2] 18.0± 4.8	277	187	−9.0± 6.7
Collembola	7	24	1.7± 1.0	53	75	2.2± 2.7	96	297	20.1± 9.5
Ephemeroptera	81	106	2.5± 3.8	465	190	−27.5± 16.4	140	42	−9.8± 6.0
Anisoptera	19	38	1.9± 1.1	21	23		10	10	
Zygoptera	3	13	1.0± .6	18	14		6	2	
Hemiptera	13	5		5	6		2	0	
Coleoptera	39	133	9.4± 7.2	79	38	−4.1± 2.7	46	18	−2.8± 2.1
Trichoptera	0	1		1	0		2	0	
Lepidoptera	2	0		4	0		0	0	
Culicini	0	0		1	0		0	0	
Chironomidae	490	458	−3.2± 24.3	679	363	−31.6± 19.7	143	193	5.0± 17.3
Other Diptera	218	287	6.9± 15.3	122	46	−7.6± 3.9	23	5	−1.8± 1.3
Gastropoda	5	21	1.6± 1.5	41	12	−2.9± 1.9	5	4	
Total	4,458	6,257	179.9±166.9	9,357	7,070	−228.7±205.3	6,079	2,549	−353.0±170.9

[1] Exceeds 5-percent level of significance.

[2] Exceeds 1-percent level of significance.

tember 20 showed an increase, whereas those collected on October 19 showed a decrease. Significant changes in the various groups of organisms were not consistent and may be largely due to sampling error. In general, the population in the check area followed what appeared to be a fairly normal seasonal trend (table 6). The 570 surface samples taken before and after individual treatments in the three ponds, throughout a series of 18 applications, indicate very little significant change in the population of surface organisms due to individual larvicidal treatments with DDT. A comparison of the data in tables 4, 5, and 6 shows no consistent change due to the individual treatments.

Some accumulative or seasonal changes in the population of the various groups of surface organisms were indicated by these studies. The seasonal trend of the total population of the surface organisms and of various groups of organisms in the treated ponds are compared with those in the check pond in figures 4 through 8. These graphs show the average number of organisms per square-foot sample from each of the three ponds at each sampling date. Figure 4 shows the

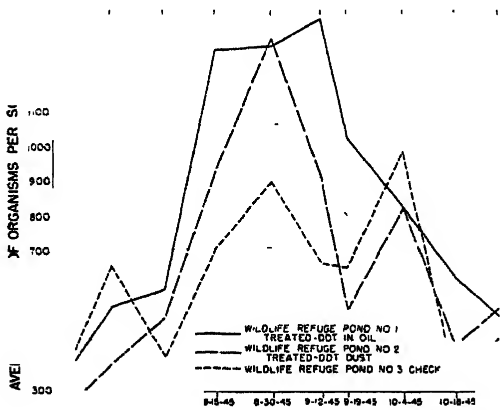

FIGURE 4.—A seasonal comparison of the population of surface organisms in an untreated pond with those in ponds routinely treated with DDT larvicides for 17 weeks. Pond 1 treated at the rate of 1 gallon fuel oil and 0.05 pound of DDT per acre, pond 2 dusted at the rate of 0.1 pound of DDT per acre, and pond 3 untreated. Graph based on 570 quantitative square-foot surface samples taken to a depth of 2 inches.

average number of all organisms per square foot found in each pond throughout the season. This graph indicates an increase in the total number of surface organisms in the treated ponds, with the greatest increase occurring in the pond treated with the DDT-oil solution.

Figure 5 shows the seasonal abundance of Cladocera in the check and treated ponds. Although the average number of Cladocera per square foot was somewhat greater in the treated ponds, it is not believed that the differences are significant. On the whole, the Cladocera

TABLE 6.—*Changes in the population of surface organisms in pond 3, the check for treated ponds 1 and 2, due to seasonal variation and errors in sampling as indicated by paired surface samples taken at intervals of 48 hours in alternate weeks*

Organism	First treatment (July 9–11, 1945)			Second treatment (July 17–19, 1945)			Fourth treatment (July 31–Aug. 2, 1945)		
	Number of paired samples								
	10			10			10		
	Number of organisms		Mean difference and its standard error	Number of organisms		Mean difference and its standard error	Number of organisms		Mean difference and its standard error
	Before	After		Before	After		Before	After	
Hydra	3	3		46	49		0	0	
Turbellaria	0	1		13	7		9	0	
Nematoda	926	876	−5.0± 43.1	1,637	1,409	−22.8± 79.0	988	1,775	78.7± 42.9
Rotatoria	618	468	−15.0± 17.0	108	183	7.5± 9.0	96	39	−5.7± 2.9
Oligochaeta	514	231	−28.3± 28.3	744	938	19.4± 68.0	739	1,279	54.0± 35.2
Hirudinea	1	0		3	0		0	0	
Cladocera	930	1,074	14.4± 38.9	2,341	1,560	−78.1± 78.0	1,076	628	[1] −44.8± 13.2
Copepoda	468	472		1,280	760	−52.0± 38.0	834	358	−47.6± 23.5
Ostracoda	1,342	1,645	30.3± 38.2	2,696	1,601	−109.5±107.0	915	682	−23.3± 29.6
Amphipoda	0	1		3	1		0	0	
Isopoda	0	0		2	1		0	0	
Hydracarina	15	23		53	38	−1.5± 2.0	35	19	−1.6± 0.9
Collembola	1	4		0	0		2	2	
Ephemeroptera	35	31		53	55		43	40	−0.3± 0.96
Anisoptera	8	8		5	3		11	11	
Zygoptera	25	18		33	25		16	20	
Hemiptera	31	24		29	16		19	14	
Coleoptera	21	14		24	33		94	60	−3.4± 2.8
Trichoptera	3	7		1	6		1	2	
Lepidoptera	4	2		6	6		6	15	
Culicini	0	3		1	1		3	4	
Anopheles	0	0		0	0		2	3	
Chironomidae	189	220	4.0± 4.5	222	284	6.2± 12.0	363	520	16.6± 19.4
Other Diptera	3	6		10	10		5	23	
Gastropoda	2	2		0	6		15	5	
Total	5,139	5,142	0.3±117.0	9,310	6,992	−231.8±351.0	5,272	5,508	23.6±116.1

[1] Exceeds 1-percent level of significance.

TABLE 6.—*Changes in the population of surface organisms in pond 3, the check for treated ponds 1 and 2, due to seasonal variation and errors in sampling as indicated by paired surface samples taken at intervals of 48 hours in alternate weeks*—Continued

Organism	Sixth treatment (Aug. 14-16, 1945)			Eighth treatment (Aug. 29-31, 1945)			Tenth treatment (Sept. 11-13, 1945)		
	Number of paired samples								
	10			9			10		
	Number of organisms		Mean difference and its standard error	Number of organisms		Mean difference and its standard error	Number of organisms		Mean difference and its standard error
	Before	After		Before	After		Before	After	
Hydra	0	2	----------	5	13	----------	1	1	----------
Turbellaria	1	0	----------	7	0	----------	74	9	−6.5± 4.4
Nematoda	2,176	1,749	−42.7± 48.6	Not counted			Not counted		
Rotatoria	137	74	−6.3± 4.1	121	40	[1] −9.0± 3.7	20	21	----------
Oligochaeta	1,561	2,473	91.2± 64.6	1,803	1,759	−4.0± 46.8	2,215	897	−131.8±112.5
Hirudinea	0	0	----------	0	0	----------	2	1	----------
Cladocera	2,055	2,054	----------	3,777	3,013	−84.9±114.4	1,945	2,219	27.4± 68.2
Copepoda	1,769	1,087	−68.2± 56.5	2,033	1,181	−94.6± 49.8	547	1,001	45.4± 28.0
Ostracoda	637	344	[1] −29.3± 10.8	531	329	−22.4± 26.2	438	482	4.4± 15.6
Amphipoda	1	0	----------	0	0	----------	0	0	----------
Palaemonetes	0	0	----------	0	0	----------	0	1	----------
Hydracarina	16	23	----------	119	64	−6.1± 3.0	107	173	6.6± 8.3
Collembola	1	3	----------	7	0	----------	0	14	----------
Ephemeroptera	79	58	−2.1± 2.2	98	32	−7.3± 5.0	143	96	−4.7± 6.0
Anisoptera	33	12	----------	28	16	−1.3± 1.1	37	25	−1.2± 1.6
Zygoptera	13	19	----------	25	13	−1.3± 1.6	33	18	−1.5± 0.8
Hemiptera	13	11	----------	26	19	−0.8± 1.2	16	4	[1] −1.2± 0.5
Coleoptera	72	47	−2.5± 1.5	61	58	----------	59	19	[1] −4.0± 1.7
Trichoptera	0	0	----------	1	1	----------	0	1	----------
Lepidoptera	1	0	----------	1	3	----------	2	2	----------
Culicini	3	0	----------	2	3	----------	0	3	----------
Anopheles	2	0	----------	1	2	----------	7	0	----------
Chironomidae	568	874	30.6± 36.7	1,772	1,033	−82.1± 55.6	1,478	740	−73.8± 58.8
Other Diptera	32	22	----------	34	54	2.2± 1.6	483	129	−35.4± 33.6
Gastropoda	2	2	----------	0	1	----------	----------	----------	----------
Total	9,172	8,854	−31.8±151.5	10,452	7,634	−313.1±263.9	7,607	5,856	−175.1±269.5

TABLE 6.—*Changes in the population of surface organisms in pond 3, the check for treated ponds 1 and 2, due to seasonal variation and errors in sampling as indicated by paired surface samples taken at intervals of 48 hours in alternate weeks*—Continued

Organism	Eleventh treatment (Sept. 18–20, 1945)			Thirteenth treatment (Oct. 2–5, 1945)			Fifteenth treatment (Oct. 17–19, 1945)		
	Number of paired samples								
	9			10			9		
	Number of organisms		Mean difference and its standard error	Number of organisms		Mean difference and its standard error	Number of organisms		Mean difference and its standard error
	Before	After		Before	After		Before	After	
Hydra	12	33	2.3± 1.4	138	132		4	1	
Turbellaria	32	21	−1.2± 1.9	19	3	−1.6± 1.4	4	1	
Nematoda	Not counted			Not counted			Not counted		
Rotatoria	17	33	1.8± 0.9	76	51	−2.5± 3.5	3	5	
Oligochaeta	1,185	1,537	39.1±60.3	2,552	1,354	−119.8±83.8	965	279	[1]−76.2 ±28.2
Cladocera	1,243	1,883	71.1±45.1	2,508	1,077	−53.1±70.9	507	264	−27.0±16.2
Copepoda	631	1,028	44.1±28.3	1,068	1,501	43.3±33.8	1,055	870	−20.5±21.5
Ostracoda	303	909	[1] 67.3±19.8	1,153	913	−24.0±40.5	349	126	[1]−24.8± 8.0
Isopoda	1	0		0	0		0	0	
Hydracarina	40	90	5.6± 3.0	101	177	7.6± 7.3	87	46	−4.5± 2.6
Collembola	*2*	*9*		*13*	*5*		1	0	
Ephemeroptera	80	193	12.6± 5.5	353	229	−12.4±25.9	72	31	−4.5± 2.7
Anisoptera	14	30	1.8± 0.9	40	30	−1.0± 2.4	10	8	
Zygoptera	11	20		19	25		43	19	−2.7± 1.2
Hemiptera	17	27	1.1± 1.3	24	31		29	34	
Coleoptera	64	47	−1.9± 3.2	27	24		9	2	
Trichoptera	0	1		0	0		0	0	
Lepidoptera	1	0		2	3		1	0	
Culicini	2	1		3	2		1	0	
Anopheles	1	1		1	0		2	0	
Chironomidae	749	1,195	49.6±23.9	2,922	1,768	−115.4±134.7	697	409	−32.0±20.1
Other Diptera	261	145	−12.9±23.4	353	185	−16.8± 15.5	45	18	−3.0± 2.5
Gastropoda	3	5		0	1		3	0	
Total	4,669	7,208	[1]282.1±122.2	11,372	8,411	−296.1±397.9	3,887	2,113	[1]−197.1±71.6

[1] Exceeds 5-percent level of significance.

populations in the check and treated areas remained remarkably similar throughout the season. It is therefore concluded, on the basis of these data, that routine treatment at the rates of 0.1 pound of DDT

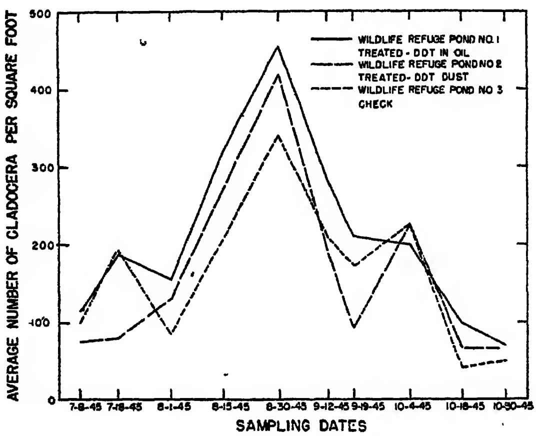

FIGURE 5.—A comparison of the seasonal abundance of Cladocera in an untreated pond with that in ponds routinely treated with DDT larvicides for 17 weeks. Treatments as indicated in figure 4. Graph based on 570 quantitative square-foot surface samples.

dust or 0.05 pound of DDT in fuel oil per acre have little or no effect on these organisms.

The effects of the two types of treatment on the population of surface insects in the ponds at the Wildlife Refuge are shown in figure 6. A comparison of the standing populations in the three ponds throughout the 17 weeks of treatment indicates a reduction in the number of surface insects in the treated ponds, with the larger reduc-

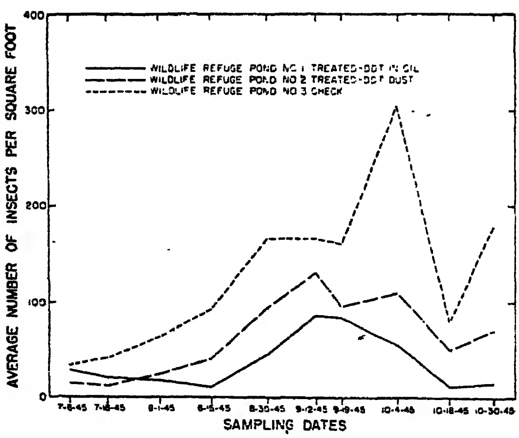

FIGURE 6.—A comparison of seasonal trends in the population of surface insects in check and treated ponds. Treatment for the various ponds as indicated in figure 4. Data from 570 quantitative square-foot surface samples.

tion occurring in the pond treated with a DDT-fuel-oil solution at the rate of 0.05 pound of DDT per acre. Most of this reduction occurred among the following orders of insects: Diptera, Coleoptera, Hemiptera, and Ephemeroptera. However, none of the orders were eliminated, and although individuals of these groups were not as abundant in the treated areas as they were in the check areas, the population in the treated areas did show a seasonal increase. From this data, it is concluded that the population of surface insects is kept at a level below their natural abundance by routine treatment, and that oil solutions are more toxic than dust.

The effect of the routine laviciding on surface aquatic insects was most pronounced on the chironomid population. Seasonal trends in the population of chironomids in the check and treated ponds are shown in figure 7, which indicates the average number of organisms taken per square foot in each of the ponds throughout the season. As in other instances, the greatest reduction occurred in the pond treated with a DDT-oil solution.

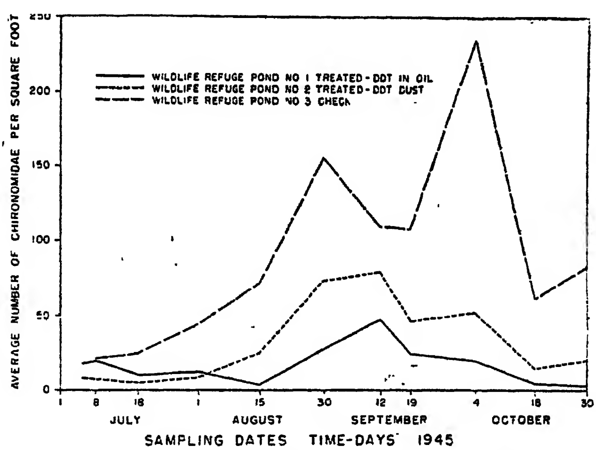

FIGURE 7.—The effects of routine larviciding with DDT on the population of Chironomidae as indicated by a comparison of the populations in check and treated areas throughout the period of treatment. Treatment as indicated in figure 4. Data based on 570 quantitative square-foot surface samples.

As has been shown previously (figure 4), the total population of surface forms increased in treated areas. This increase occurred in spite of a considerable decrease in the aquatic insects and was largely due to a significant increase in a few forms. In the treated ponds at the Wildlife Refuge, there was a considerable increase in the nematodes, oligochaetes and copepods. The seasonal abundance of oligochaetes in the check and treated ponds is compared in figure 8. Their increase in abundance in the treated ponds was rapid and significant, and suggests the limiting of some other forms of life by the DDT. It is

probable that the DDT reduced the predators or competitors of the oligochaetes nematodes, and copepods. The significance of this change from the standpoint of fish production is not definitely known,

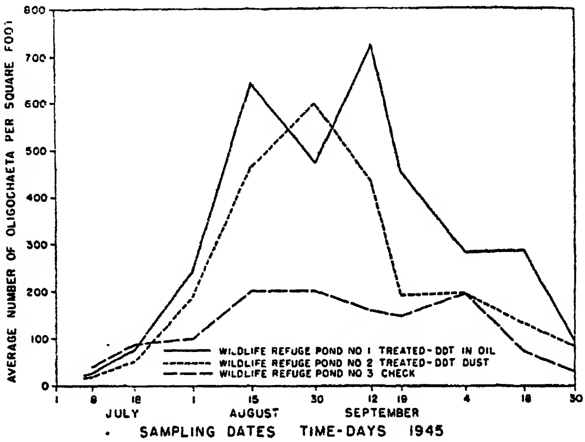

FIGURE 8.—A comparison of the abundance of Oligochaeta in untreated and treated areas during the period of 17 routine treatments with DDT larvicides. Treatments for the ponds as indicated in figure 4. Data based on 600 quantitative square-foot surface samples.

since data are not available on the relative value of chironomids, in contrast to oligochaetes and nematodes, as fish food. Although chironomids are much larger forms, the others occur in great numbers, and the total volume of food produced may not be greatly modified by the change in the composition of the population.

Studies made in other ponds indicated much the same changes as those observed in the Refuge ponds. In general, there was an increase in nematodes, oligochaetes, and copepods, a decrease in chironomids, surface Hemiptera, Coleoptera, and Ephemeroptera, while other forms remained about the same.

Test pond 4 was routinely dusted by a crew regularly engaged in mosquito control. Treatment began on April 4, 1945, and continued into October. A total of 26 applications were made with a dust containing 1 percent DDT and 99 percent pyrophyllite, applied at the average rate of about 0.2 pound of DDT per acre. The effects of the first 4 applications on the population of surface organisms, as indicated by some 120 random square-foot surface samples taken before and after the individual treatments, are summarized in table 7. In this table, the average number of each group of organisms taken before treatment, and the mean difference between the number taken before and after treatment, are shown. Decreases in the average number found after treatment are indicated by a minus sign. The standard error of the mean difference has been calculated for those groups judged to be of importance, and the t and P values determined.

TABLE 7.—*Changes in the population of surface organisms in test pond number 4 due to routine dusting with 0.2 pound of DDT per acre, as indicated by random quantitative samples taken before and after the first four treatments*

Organism	First treatment (Apr. 4, 1945)		Second treatment (Apr. 12, 1945)		Third treatment (Apr. 21, 1945)		Fourth treatment (May 1, 1945)	
	Average number before treatment	Mean difference after treatment, and its standard error	Average number before treatment	Mean difference after treatment, and its standard error	Average number before treatment	Mean difference after treatment, and its standard error	Average number before treatment	Mean difference after treatment, and its standard error
Hydra	34.7	0	34.7	[1] −26.9±10.6	7.8	0.6	8.3	−3.4
Turbellaria	2.1	−2.1	0		0		0	
Nematoda	321.3	315.7±236	637.0	−453.7±235.3	183.3	−58.1	125.1	−43.6
Rotatoria	5.0	−1.4	3.6	.9	4.5	−1.5	3.0	−1.8
Bryozoa	5.2	24.1	29.3	−23.6	5.6	4.0	9.7	4.0
Oligochaeta	287.5	86.9	374.0	−254.1±139.0	120.3	[1] 611.7±302	732.0	−276.4±320.5
Cladocera	7.7	[1] 10.7±4.7	18.4	−7.7±6.7	10.7	[1] 37.1±17.4	47.8	−15.6±19.0
Copepoda	36.6	−8.1	29.7	−5.0	23.5	[1] 57.0±26.9	80.5	−43.0±25.4
Ostracoda	13.5	−3.8	9.7	−4.6	5.1	146.8±81.2	151.9	−129.0±73.3
Hydracarina	2.0	1.0	3.0	4.4	7.4	−.1	7.2	−5.7
Collembola	.2	0	.2	−.2				
Ephemeroptera	7.6	−2.1	5.5	−3.6±2.5	2.0	3.8	5.7	−3.3
Anisoptera	1.7	1.0	2.6	−2.5	.2	.2	.4	.3
Zygoptera	1.0	−.7	.3	−.2	.1	.1	.2	−.1
Hemiptera	.3	−.2	.1	0	.1	0	.1	.7
Coleoptera	1.4	.3	1.7	−1.4	.3	2.8	3.0	−2.0
Trichoptera	.2	−.1	.1	−.1				.1
Lepidoptera	1.4	1.3	2.7	−1.3	1.4	.1	1.5	−1.2
Culicini	.1	.2	.3	−.3				
Anopheles		.1	.1	−.1			.1	
Chironomidae	102.1	−46.6±29.4	55.4	−18.2	37.2	107.6±65.7	144.8	−71.3±63.4
Other Diptera	78.2	13.0	91.1	−62.0±32.5	29.1	−9.6	19.5	−9.6±8.4
Gastropoda	7.6	11.3	18.8	−16.3	2.6	−.6	2.0	−1.3
Total	917.3	400.4±462	1,317.7	[1] −876.0±438.3	441.6	901.7±495	1,343.0	−601.8±487.0

[1] Exceeds 5-percent level of significance.

TABLE 8.—*Changes in the population of surface organisms in test pond number 4 due to routine dusting with 0.2 pound of DDT per acre, as indicated by paired quantitative square-foot surface samples taken just before, and 48 hours after, the indicated treatments*

Organism	Eighth treatment (May 28, 1945)			Tenth treatment (June 12, 1945)			Sixteenth treatment (July 27, 1945)		
	Number of paired samples								
	14			10			10		
	Number of organisms		Mean difference and its standard error	Number of organisms		Mean difference and its standard error	Number of organisms		Mean difference and its standard error
	Before	After		Before	After		Before	After	
Hydra	0	0		0	1		0	0	
Nematoda	Not counted			474	118	−35.6± 22.0	439	758	31.9± 39.0
Rotatoria	13	7		2	0		0	0	
Bryozoa	178	13	−11.8± 8.0	35	26		0	0	
Oligochaeta	Not counted			9,073	10,058	98.5±220.5	18,934	883	−1,805.1±1,155.0
Cladocera	219	20	−14.2± 9.2	7	7		89	25	−0.4± 6.1
Copepoda	337	522	13.2± 7.8	174	258	8.4± 10.4	975	216	−75.9± 67.6
Ostracoda	523	1,385	61.6±33.6	3,111	2,438	−67.3±106.6	1,493	737	−75.6± 80.3
Amphipoda	0	0		0	1		0	0	
Isopoda	0	0		0	0		6	0	
Palaemonetes	0	0		0	0		0	1	
Hydracarina	1	11		6	2		12	7	
Collembola	0	2		31	62	3.1± 4.3	416	27	−38.9± 29.5
Ephemeroptera	23	41	1.3± 0.1	29	14	−1.5± 1.7	3	0	
Anisoptera	12	38		57	101	4.4± 3.4	32	13	
Zygoptera	1	9		3	26		30	31	
Hemiptera	9	8		9	4		4	5	
Coleoptera	10	20		6	13		43	27	
Trichoptera	0	1		0	0		0	0	
Lepidoptera	9	31	1.6± 0.9	82	121	3.9± 2.0	10	2	
Culicini	1	0		0	0		0	0	
Anopheles	0	0		0	0		0	17	
Chironomidae	355	518	11.6±21.9	705	827	12.2± 34.7	194	239	4.5± 12.0
Other Diptera	113	107	−0.4± 3.8	97	181	8.4± 8.4	17	25	
Gastropoda	30	147	8.4± 5.0	66	66		17	76	
Total	1,834	2,880	74.7±58.9	13,967	14,324	35.7±358.0	22,714	3,089	−1,962.5±1,290.8

A 5-percent level of significance has been selected as significant for changes after treatment. It will be noted (table 7) that although there was considerable variation in the numbers of the various groups of organisms taken before and after treatment, very few of the changes were significant and these were not consistent changes.

Changes due to the eighth, tenth, and sixteenth treatment in pond 4, as indicated by paired surface samples, are summarized in table 8. The mean numbers of organisms taken in 10 samples before and after treatment are shown, along with the differences between these means and the standard error of this difference, for those groups judged to be the most important or having the largest numbers of individuals. No significant changes were noted. Sampling was discontinued after the sixteenth treatment, due to the entrance of brackish water through a newly constructed drainage ditch.

Results of treatments in ponds 5 and 6 are summarized in table 9. These ponds were located in the Camp Stewart area and were small, temporary sand-bottom ponds, resulting from the overflow of the Canoochee River. Pond 5 was treated with a DDT-fuel-oil solution, to which was added 0.5 percent of B-1956[5] in order to improve the spreading properties of the fuel oil. Some significant changes appear to have resulted from the three treatments. There was a significant decrease in total organisms after the first treatment, and a general decrease in the mayflies and midges, whereas the copepods, ostracods, and nematodes showed a distinct increase after the third treatment.

Emulsions were used for the larviciding in pond 6. The first application consisted of an emulsion made by adding 1 gallon of fuel oil, containing 0.1 pound of DDT and 0.5 percent of a spreading agent, to 14 gallons of water. Treatment was at the rate of 15 gallons of emulsion per acre for both the first and second treatments, but the amounts of oil and DDT were doubled for the second application. Surface Hemiptera and Coleoptera were killed by both treatments, and there was a marked decrease in the mayflies and chironomids. However, other forms, such as nematodes, oligochaetes, and copepods, increased to such an extent that there was a significant increase in the total population after the first treatment, and a considerable increase after the second.

Test pond No. 7 had a permanent inflow of water from a nearby artesian well. It was given weekly routine treatments at the rate of 0.1 pound of DDT and 1 gallon of fuel oil per acre. Treatment began early in July and was discontinued in December. The effects of the various individual treatments are summarized in table 10. Gross observations indicated that the first two applications killed a large number of Coleoptera and Hemiptera. Members of these

[5] B-1956 is a spreading agent manufactured by the Rohm & Haas Co. of Philadelphia, Pa.

TABLE 9.—*Changes in the population of surface organisms in two test ponds due to treatments with DDT larvicides, as shown by paired square-foot samples taken just before, and 48 hours after, each treatment*

Number of paired samples	8			7			10			10			4		
Dosage per acre	1 gallon fuel oil, 0.1 pound DDT			2 gallons fuel oil, 0.1 pound DDT			2 gallons fuel oil, 0.1 pound DDT			Emulsion: 14 gallons water, 1 gallon fuel oil, 0.1 pound DDT			Emulsion: 13 gallons water, 2 gallons fuel oil, 0.2 pound DDT		
Organism	Pond No. 5									Pond No. 6					
	First treatment (May 17, 1945)			Second treatment (May 24, 1945)			Third treatment (June 1, 1945)			First treatment (May 17, 1945)			Second treatment (May 25, 1945)		
	Number of organisms		Mean difference and its standard error	Number of organisms		Mean difference and its standard error	Number of organisms		Mean difference and its standard error	Number of organisms		Mean difference and its standard error	Number of organisms		Mean difference and its standard error
	Before	After		Before	After		Before	After		Before	After		Before	After	
Hydra	6	0		0	3		0	0		1	4		1	1	
Nematoda	65	83	2.3± 3.6	77	89	1.7± 6.4	72	181	10.9± 6.0	258	389	13.1± 9.8	75	122	11.8±15.8
Oligochaeta	163	138	−3.1± 7.8	62	357	42.1±21.2	2,062	402	−166.0±81.8	417	634	21.7±18.5	81	109	7.0±24.5
Cladocera	184	130	−6.8± 5.9	104	207	14.7±10.7	210	237	2.7± 9.2	216	310	9.4± 4.6	66	75	2.3±12.6
Copepoda	547	637	11.3±16.8	545	890	49.3±40.1	705	1,856	[2] 115.1±33.5	608	1,949	[2] 125.1±30.1	806	1,029	55.8±35.2
Ostracoda	28	17		16	50	4.8± 2.7	116	598	[1] 48.2±17.4	202	166	−3.6±16.6	4	39	[1] 8.8± 2.3
Amphipoda	9	1		0	1		4	3		0	0		0	0	
Palaemonetes	6	5		4	4		4	15		3	8		8	2	
Hydracarina	6	6		5	2		11	13		71	58		30	36	1.5± 5.5
Ephemeroptera	82	23	[1] −7.4± 3.0	23	10	[1] −1.9± 0.6	7	15		65	24	−4.1± 2.1	6	3	
Anisoptera	15	3		2	2		1	2		5	4		0	4	
Zygoptera	10	4		3	7		8	21		4	9		3	16	
Hemiptera	6	3		2	2		6	16		6	5		0	0	
Coleoptera	7	4		4	5		2	3		3	6		0	1	
Trichoptera	1	0		0	0		0	0		0	0		0	0	
Lepidoptera	1	1		1	0		0	0		0	0		0	0	
Culicini	0	0		0	1		0	0		0	0		0	0	
Anopheles	0	2		2	0		0	0		0	0		0	0	
Chironomidae	625	68	−69.6±29.9	50	23	−3.9± 2.7	106	27	[1] −7.9± 3.4	329	58	[1] −27.1±10.1	22	4	−4.5± 4.5
Other Diptera	24	11		5	2		14	7		22	23		7	2	
Gastropoda	0	0		0	0		0	0		2	1		0	0	
Total	1,785	1,136	[1] −81.1±31.7	905	1,655	107.1±71.2	3,328	3,396	6.8±95.6	2,302	3,648	[2] 134.6±38.1	1,109	1,443	83.5±93.4

[1] Exceeds 5-percent level of significance.

[2] Exceeds 1-percent level of significance.

Table 10.—*Effects on the surface organisms in test pond No. 7 of the routine use of 0.1 pound of DDT in 1 gallon of fuel oil per acre, as shown by square-foot surface samples taken just before, and 48 hours after, each treatment*

Organism	First treatment (July 9, 1945)			Second treatment (July 17, 1945)			Fourth treatment (Aug. 1, 1945)			Sixth treatment (Aug. 14, 1945)			Eighth treatment (Aug. 28, 1945)		
	Number of paired samples														
	10			10			10			9			10		
	Number of organisms		Mean difference and its standard error	Number of organisms		Mean difference and its standard error	Number of organisms		Mean difference and its standard error	Number of organisms		Mean difference and its standard error	Number of organisms		Mean difference and its standard error
	Before	After		Before	After		Before	After		Before	After		Before	After	
Turbellaria	0	1		0	0		0	0		0	0		0	0	
Nematoda	17	24		6	11		35	5	−3.0± 2.6	40	148	12.0± 9.0	Not counted		
Rotatoria	0	0		0	0		0	0		1	0		0	0	
Oligochaeta	22	32	1.0± 1.0	47	19	−2.8± 1.4	335	155	−18.0± 20.2	430	231	−22.1± 12.5	247	226	−2.1±10.3
Hirudinea	0	0		0	2		0	0		0	2		0	0	
Cladocera	2,389	1,895	−49.4± 99.1	2,028	1,770	−25.8±110.5	1,760	2,484	72.4± 72.8	2,054	130	−213.7±104.9	164	123	−4.1± 4.1
Copepoda	7,587	7,051	−53.6±252.5	6,288	5,426	−86.2±165.4	5,617	7,862	224.5±214.3	3,163	2,002	−129.0± 95.3	289	422	13.3± 6.1
Ostracoda	269	252	−1.7± 9.5	349	212	−13.7± 10.0	187	106	[1] −8.1± 3.6	287	118	−18.8± 12.1	108	183	7.5± 7.7
Hydracarina	23	14	−0.9± 1.0	45	11	−3.4± 2.0	19	23	0.4± 2.1	56	1	−6.1± 3.4	11	8	
Collembola	2	3		0	4		0	6		3	1		12	1	−1.1± 0.7
Ephemeroptera	20	10	−1.0± 0.9	26	9	−1.7 ± 0.9	17	5	−1.2± 1.2	32	2	−3.3± 3.1	1	0	
Anisoptera	68	58	−1.0± 1.9	63	50	−1.3± 2.4	100	65	−3.5± 2.7	48	13	[1] −3.9± 1.5	7	10	
Zygoptera	8	15		9	10		16	8	−0.8± 0.8	24	21		6	7	
Hemiptera	12	23		9	8		3	7		7	3		5	0	
Coleoptera	12	12		10	11		4	4		8	4		6	3	
Lepidoptera	6	3		3	1		2	0		2	0		0	0	
Culicini	9	3		9	0		4	0		0	0		0	0	
Anopheles	1	0		0	0		0	0		0	0		0	0	
Chironomidae	4,550	1,030	[2] −352.0± 88.2	710	104	−60.6± 32.1	607	130	[1] −47.7± 19.9	124	28	−10.7± 4.9	14	4	−1.0± 0.7
Other Diptera	82	46	−3.6± 1.8	17	19		70	10	[1] −6.0± 1.9	30	9	[1] −2.3± 0.9	36	21	−1.5± 1.4
Gastropoda	6	3		11	1		13	0	[1] −1.3± 0.5	8	9		9	18	
Total	15,083	10,475	−460.8±400.1	9,630	7,668	−196.2±299.1	8,789	10,870	208.1±275.4	6,317	2,722	−399.4±201.5	915	1,026	11.1±23.7

[1] Exceeds 5-percent level of significance.
[2] Exceeds 1-percent level of significance.

TABLE 10.—*Effects on the surface organisms in test pond No. 7 of the routine use of 0.1 pound of DDT in 1 gallon of fuel oil per acre, as shown by square-foot surface samples taken just before, and 48 hours after, each treatment*—Continued

Organism	Tenth treatment (Sept. 13, 1945)			Eleventh treatment (Sept. 19, 1945)			Thirteenth treatment (Oct. 2, 1945)			Fifteenth treatment (Oct. 15, 1945)			Seventeenth treatment (Oct. 29, 1945)		
	Number of paired samples														
	10			10			10			10			10		
	Number of organisms		Mean difference and its standard error	Number of organisms		Mean difference and its standard error	Number of organisms		Mean difference and its standard error	Number of organisms		Mean difference and its standard error	Number of organisms		Mean difference and its standard error
	Before	After		Before	After		Before	After		Before	After		Before	After	
Turbellaria	0	0		1	0		0	0		0	1		7	2	−0.5
Nematoda	104	157	5.3± 8.2	Not counted			Not counted			Not counted			Not counted		
Rotatoria	0	0		3	0		0	0		0	0		0	0	
Oligochaeta	747	432	−31.5± 29.8	1,239	613	−62.6± 49.2	909	711	−19.8± 16.3	962	944	−1.8± 72.8	1,647	659	−98.8± 62.3
Hirudinea	0	0		0	0		0	0		1	0		0	0	
Cladocera	132	205	7.3± 7.5	149	57	−9.2± 7.3	413	587	17.4± 12.8	1,466	356	−111.0± 54.2	761	981	22.0± 36.0
Copepoda	558	1,713	115.5± 82.9	1,121	1,680	55.9± 68.7	5,856	7,838	198.2±242.1	7,407	2,527	[1]−488.0±169.4	4,039	3,850	−18.9± 99.9
Ostracoda	166	171	0.5± 3.9	146	215	6.9± 10.2	532	378	−15.4± 15.7	1,084	428	−65.6± 39.2	589	455	−13.4± 10.9
Isopoda	0	0		0	0		0	0		0	0		0	0	
Hydracarina	8	36	2.8± 1.6	24	6	−1.8± 1.2	23	54	3.1± 1.5	177	62	−11.5± 8.6	72	43	−2.9± 1.8
Collembola	3	6		23	28		44	153	10.9± 4.9	13	10		3	3	
Ephemeroptera	10	7		3	3		11	10		28	3	−2.5± 2.2	16	5	
Anisoptera	30	20		17	19		105	108		163	68	−9.5± 6.3	105	76	−2.9± 3.4
Zygoptera	8	14		21	11		22	18		18	9		21	25	
Hemiptera	4	5		1	1		4	6		1	0		0	0	
Coleoptera	5	6		6	7		3	6		17	6	−1.1± 1.1	2	3	
Trichoptera	0	0		0	0		0	0		1	0		0	0	
Lepidoptera	2	1		1	1		1	0		0	0		0	0	
Culicini	1	0		0	0		0	0		0	0		0	0	
Chironomidae	407	273	−13.4± 10.5	35	46	1.1± 1.5	114	112		89	53	−3.6± 2.9	11	7	
Other Diptera	61	25	−3.6± 2.1	490	208	−28.2± 18.4	215	178	−3.7± 7.4	127	61	−6.6± 5.6	30	23	−0.7
Gastropoda	61	34	−2.7± 2.2	138	27	−11.1± 8.1	46	24	−2.2± 1.7	217	67	−15.0± 8.7	207	339	13.2± 8.5
Total	2,307	3,105	79.8±121.7	3,418	2,922	−49.6±136.2	8,298	10,183	188.5±259.6	11,771	4,595	−717.6±324.7	7,510	6,471	−103.9±156.6

[1] Exceeds 5-percent level of significance.

orders were found dead after each of the 22 applications applied to the pond, indicating a reduction but not an elimination of surface forms. Surface sampling was discontinued after the seventeenth treatment. As indicated in table 10, few significant changes occurred due to individual treatments. However, long-term or cumulative effects were noted after treatment had continued for a number of weeks. The larger members of the families Gyrinidae, Dytiscidae, Haliplidae, Hydrophilidae, Corixidae and Gerridae became quite scarce after several treatments. Further, the quantitative surface samples indicated a reduction in Chironomidae and Ephemeroptera, whereas there was an increase in Oligochaeta. The seasonal trends of the population of oligochaetes, insects, and chironomids in a treated pond are shown graphically in figure 9. All insects, and chironomids in particular, were drastically reduced by the treatments with DDT, whereas the oligochaetes steadily increased. This change was observed in all ponds treated routinely.

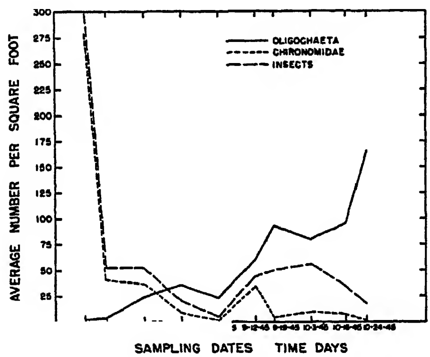

FIGURE 9.—Trends in the population of Oligochaeta, Chironomidae, and Insecta in a pond routinely treated for 17 weeks at the rate of 1 gallon fuel oil and 0.1 pound of DDT per acre. Graph based on 200 quantitative square-foot surface samples.

SUMMARY

Quantitative sampling of the surface forms and counts of dead organisms on the water surface 24 hours after treatment were the methods used for determining the effects of routine treatment with DDT larvicides.

Routine applications of DDT as a dust caused little apparent damage to the surface organisms, as indicated by gross observations. Paired square-foot surface samples, taken before and 48 hours after treatment, indicated few significant changes due to treatment. The seasonal trend of the population of surface organisms was somewhat affected by routine treatments with dust at the rate of 0.1 pound of DDT per acre, but the changes were not as great as those caused by treatments with solutions of DDT in fuel oil.

DDT-fuel-oil solutions killed the large surface insects, such as Dytiscidae, Gyrinidae, Hydrophilidae, and Corixidae, at concentrations as low as 0.025 pound of DDT per acre. However, the kills resulting from applications of 0.05 or 0.025 pound of DDT per acre were proportionately much less than those resulting from applications at the rate of 0.1 pound per acre. As was true for treatments with dust, few significant changes occurred due to any single treatment. The seasonal effects of routine DDT treatments, as indicated by a comparison of the population of surface organisms in the treated and check ponds, were quite marked. There was an increase in the number of Oligochaeta, Nematoda, and Copepoda, and a decrease in the Chironomidae, Hemiptera, Coleoptera, and Ephemeroptera. Insects as a group decreased in number in the treated ponds, with the largest decrease occurring among the Chironomidae.

The net results of these changes are difficult to evaluate, but it appears that there is some reduction in the available supply of fish food. Although the forms which increase in numbers often occur in great abundance, they are much smaller than the forms which are reduced in number, and in general they are not as readily taken by the fish. Reductions noted to date, however, have not been sufficient to affect the breeding stock, and since treatment is in localized areas, it is probably not sufficient to seriously limit the fish population by restriction of the food supply.

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Several members of the staff of Carter Memorial Laboratory were engaged in the study of the effects of DDT larviciding on the surface organisms. Mr. William Lynn assisted in the taking of the surface samples. Miss Kate Purvis, Mrs. B. B. Whitmarsh, Miss Marjorie Chaplin, and Mrs. Dorothy Coleman counted and recorded the various groups of organisms in the laboratory. Miss Rosetta Davis made the calculations and assisted in the preparation of the tables. The author wishes to express his appreciation to other members of the staff who have assisted in numerous ways, and especially to Dr. S. W. Simmons who made the study possible and actively encouraged and expedited the investigations.

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(*2*) Hess, A. D., and Tarzwell, C. M.: The feeding habits of *Gambusia affinis affinis* with special reference to the malaria mosquito, *Anopheles quadrimaculatus*. Am. J. Hyg., 35: 142–151 (January 1942).

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED MARCH 22, 1947

Summary

A total of 52,115 cases of influenza was reported for the week (exclusive of Kentucky, where special surveys showed 20,515 cases of upper respiratory infection), as compared with 42,997 last week, 3,477 for the corresponding week last year, and 14,953 for the week in 1939, the last named figure being the largest number reported for any corresponding week of the past 12 years. Declines were reported in only the West North Central and Mountain areas, resulting from decreased numbers reported in Kansas, Colorado, and Arizona. Of 19 States reporting more than 200 cases each, 16 showed an increase of 14,841, and 3 reported a decline of 5,436. Reports of 12 States, showing for the current week 565 or more cases each and aggregating 48,032, are as follows (last week's figures in parentheses): *Increases*—Iowa 2,321 (970), Virginia 1,439 (1,151), West Virginia 2,589 (2,099), South Carolina 1,814 (1,518), Georgia 1,019 (482), Alabama 1,847 (328), Arkansas 6,859 (5,306), Oklahoma 7,624 (1,083), Montana 565 (193); *decreases*—Kansas 1,947 (6,260), Texas 19,087 (19,527), Colorado 921 (1,604). The total for the year to date is 157,694, as compared with 173,413 for the same period last year and a 5-year (1942–46) median of 57,807. During the 4 weeks ended with the current week, a total of 125,077 cases has been reported, as compared with 18,400 for the corresponding period last year, a 5-year median of 17,615, and 63,297, the largest number for any corresponding period of the past 12 years (in 1939).

Of 31 cases of poliomyelitis, 2 less than reported for last week (which was the average week of lowest seasonal incidence) 12 occurred in California. The total for the year to date is 656, as compared with 493 for the same period last year and a 5-year median of 320.

Both the current and cumulative figures for diphtheria, measles, meningococcus meningitis, scarlet fever, smallpox, typhoid and paratyphoid fever, and typhus fever are below the respective corresponding 5-year medians.

Deaths recorded for the week in 93 large cities of the United States totaled 10,225, as compared with 10,310 last week, 9,569 and 9,640, respectively, for the corresponding weeks of 1946 and 1945, and a 3-year (1944–46) median of 9,605. The cumulative figure is 120,684, as compared with 123,115 for the corresponding period last year.

Telegraphic morbidity reports from State health officers for the week ended Mar. 22, 1947, and comparison with corresponding week of 1946 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria: Week ended— Mar. 22, 1947	Diphtheria: Week ended— Mar. 23, 1946	Diphtheria: Median 1942–46	Influenza: Week ended— Mar. 22, 1947	Influenza: Week ended— Mar. 23, 1946	Influenza: Median 1942–46	Measles: Week ended— Mar. 22, 1947	Measles: Week ended— Mar. 23, 1946	Measles: Median 1942–46	Meningitis, meningococcus: Week ended— Mar. 22, 1947	Meningitis, meningococcus: Week ended— Mar. 23, 1946	Meningitis, meningococcus: Median 1942–46
NEW ENGLAND												
Maine	2	6	1	-------	5	2	148	24	24	0	1	2
New Hampshire	0	0	0	2	2	1	6	4	10	2	0	0
Vermont	0	1	0	11	-------	-------	230	16	39	0	0	0
Massachusetts	22	3	3	-------	-------	-------	376	761	782	0	6	8
Rhode Island	1	2	1	1	1	-------	173	4	31	0	1	2
Connecticut	0	1	1	2	3	2	642	185	349	1	3	4
MIDDLE ATLANTIC												
New York	18	14	15	[1] 10	[1] 3	[1] 6	424	4,221	2,413	9	22	32
New Jersey	10	4	4	22	5	10	432	2,591	1,515	1	3	5
Pennsylvania	10	21	10	-------	3	3	321	3,949	1,206	12	8	12
EAST NORTH CENTRAL												
Ohio	8	18	11	74	4	14	817	571	571	2	6	7
Indiana	13	14	7	179	10	10	48	1,098	262	2	5	5
Illinois	5	54	14	475	30	30	93	1,802	1,092	4	9	10
Michigan [2]	4	11	10	4	1	3	31	3,032	904	5	2	11
Wisconsin	0	5	5	537	70	55	291	1,791	1,260	1	1	3
WEST NORTH CENTRAL												
Minnesota	6	7	5	-------	-------	1	32	45	121	3	3	3
Iowa	2	5	4	2,321	-------	-------	29	133	239	2	6	0
Missouri	7	2	4	378	3	3	14	340	414	9	5	6
North Dakota	2	0	0	190	6	9	15	22	61	0	0	0
South Dakota	3	0	2	17	-------	-------	11	50	50	0	0	0
Nebraska	2	3	3	116	8	8	21	304	239	0	0	0
Kansas	6	4	4	1,947	2	4	7	1,121	760	3	2	5
SOUTH ATLANTIC												
Delaware	0	0	0	-------	-------	-------	1	44	29	2	1	1
Maryland [2]	8	13	3	23	7	6	22	453	453	2	5	5
District of Columbia	0	0	0	5	-------	1	27	214	91	1	5	2
Virginia	5	5	5	1,439	193	442	299	687	687	3	8	10
West Virginia	2	6	3	2,589	-------	8	34	86	86	1	3	3
North Carolina	8	14	8	-------	-------	7	248	482	482	2	0	9
South Carolina	0	3	3	1,814	539	515	128	433	259	1	0	2
Georgia	3	1	5	1,019	261	79	181	306	298	1	0	3
Florida	3	1	2	73	4	4	8	130	130	3	2	3
EAST SOUTH CENTRAL												
Kentucky	11	10	4	[4] -------	47	19	7	596	106	0	5	5
Tennessee	15	6	6	550	33	50	115	283	218	3	5	8
Alabama	7	6	6	1,847	124	124	113	141	342	4	8	8
Mississippi [2]	5	13	2	354	-------	-------	21	-------	-------	2	1	6
WEST SOUTH CENTRAL												
Arkansas	5	5	5	6,859	109	109	212	172	172	1	3	3
Louisiana	5	16	6	85	88	47	42	233	197	3	10	6
Oklahoma	5	8	5	7,624	125	125	-------	182	89	3	1	1
Texas	20	40	37	19,087	1,504	1,049	216	1,867	1,867	6	8	8
MOUNTAIN												
Montana	3	1	1	565	-------	17	136	26	53	0	1	1
Idaho	0	0	0	147	26	3	9	150	92	1	0	0
Wyoming	0	0	0	25	1	20	11	36	71	1	1	0
Colorado	7	8	8	921	29	29	43	637	367	0	0	0
New Mexico	2	2	1	12	4	4	61	9	33	0	0	0
Arizona	4	1	1	86	133	137	30	105	105	0	1	0
Utah [2]	0	0	0	81	1	29	3	655	266	0	1	0
Nevada	0	0	0	3	-------	-------	1	13	13	0	0	0
PACIFIC												
Washington	11	8	2	353	-------	5	54	806	291	3	5	5
Oregon	0	1	1	241	-------	30	32	403	144	0	0	1
California	27	25	24	27	93	91	214	3,087	2,584	7	9	20
Total	277	368	272	52,115	3,477	3,477	6,429	34,300	24,632	106	166	225
12 weeks	3,510	4,611	3,713	157,694	173,413	57,807	62,501	186,541	184,225	1,039	2,399	3,016
Seasonal low week [3]	27th July 5–11			(30th) July 26–Aug. 1			(35th) Aug. 30–Sept. 5			(37th) Sept. 13–19		
Total since low	11,076	16,255	12,509	190,669	535,661	93,669	85,388	212,665	222,238	2,011	3,903	5,468

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Dates between which the approximate low week ends. The specific date will vary from year to year.
[4] 20,515 cases of upper respiratory infection were reported, some of which were probably influenza.

Telegraphic morbidity reports from State health officers for the week ended Mar. 22, 1947, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever [5]		
	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46
	Mar. 22, 1947	Mar. 23, 1946		Mar. 22, 1947	Mar. 23, 1946		Mar. 22, 1947	Mar. 23, 1946		Mar. 22, 1947	Mar. 23, 1946	
NEW ENGLAND												
Maine	1	0	0	15	33	33	0	0	0	2	0	0
New Hampshire	0	0	0	11	3	13	0	0	0	0	0	0
Vermont	0	1	0	12	2	10	0	0	0	0	0	0
Massachusetts	0	0	0	140	199	388	0	0	0	3	5	1
Rhode Island	0	0	0	8	3	16	0	0	0	0	0	0
Connecticut	0	0	0	36	62	78	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York	0	5	2	415	684	646	0	0	0	3	0	5
New Jersey	0	1	0	143	135	174	0	0	0	2	0	1
Pennsylvania	2	2	2	231	451	603	0	0	0	2	2	3
EAST NORTH CENTRAL												
Ohio	0	2	0	469	409	409	0	0	1	1	3	2
Indiana	0	1	0	136	108	132	0	1	1	1	1	3
Illinois	3	1	1	175	224	311	0	0	1	1	1	1
Michigan [2]	0	0	0	168	148	283	0	0	0	1	0	2
Wisconsin	0	0	0	97	165	294	0	0	0	1	2	1
WEST NORTH CENTRAL												
Minnesota	0	0	0	72	49	95	0	0	0	0	0	0
Iowa	0	0	0	53	67	79	0	2	0	0	0	0
Missouri	1	0	0	64	55	110	0	0	0	0	1	2
North Dakota	4	0	0	13	15	23	0	0	0	0	0	0
South Dakota	0	0	0	15	12	18	0	0	0	0	0	0
Nebraska	3	0	0	42	32	54	2	0	0	0	0	0
Kansas	0	0	1	32	74	96	0	0	0	0	0	0
SOUTH ATLANTIC												
Delaware	0	0	0	14	9	15	0	0	0	0	0	0
Maryland [2]	0	0	0	55	103	107	0	0	0	0	0	0
District of Columbia	0	0	0	6	25	25	0	0	0	0	1	0
Virginia	1	0	0	53	121	121	0	0	0	1	0	1
West Virginia	0	0	0	10	30	39	0	0	0	0	0	1
North Carolina	0	0	0	35	51	26	0	0	0	0	2	2
South Carolina	0	0	0	5	14	9	0	0	0	3	0	0
Georgia	0	0	0	8	6	14	0	1	0	0	5	3
Florida	0	1	0	14	4	4	0	0	0	1	0	1
EAST SOUTH CENTRAL												
Kentucky	0	1	0	56	41	55	0	0	0	1	0	0
Tennessee	0	0	0	72	36	47	0	0	0	0	0	1
Alabama	0	1	1	30	25	17	0	0	0	0	0	1
Mississippi [2]	0	2	0	15	6	16	0	0	0	0	1	1
WEST SOUTH CENTRAL												
Arkansas	1	0	0	1	14	15	0	1	1	0	1	1
Louisiana	1	1	0	2	9	10	1	1	0	0	5	[illegible]
Oklahoma	0	0	0	14	18	17	0	0	1	0	1	1
Texas	1	1	4	38	61	61	0	0	0	2	6	6
MOUNTAIN												
Montana	0	1	0	6	10	10	0	0	0	0	0	0
Idaho	0	0	0	11	4	6	0	0	0	0	0	0
Wyoming	0	0	0	4	17	17	0	0	0	0	0	0
Colorado	0	0	0	61	43	57	0	0	0	2	0	0
New Mexico	0	1	0	2	17	14	1	0	0	0	0	1
Arizona	0	0	0	7	17	17	0	0	0	1	1	0
Utah [2]	0	0	0	20	47	47	0	0	0	0	1	0
Nevada	0	0	0	0	1	1	0	0	0	0	0	0
PACIFIC												
Washington	1	1	1	59	27	53	0	7	0	5	2	1
Oregon	0	0	0	15	17	19	0	0	0	0	0	0
California	12	4	3	143	174	200	0	1	0	3	2	2
Total	31	27	24	3,103	3,877	4,260	4	14	14	36	43	53
12 weeks	656	493	320	32,977	40,402	45,344	49	99	152	521	518	674
Seasonal low week [3]	(11th) Mar. 15–21			(32nd) Aug. 9–15			(35th) Aug. 30–Sept. 5			(11th) Mar. 15–21		
Total since low	31	27	24	59,663	78,973	87,440	103	175	269	36	43	53

[2] Period ended earlier than Saturday.
[3] Dates between which the approximate low week ends. The specific date will vary from year to year.
[5] Including paratyphoid fever reported separately, as follows: Maine 1; Massachusetts 3 (salmonella infection); New York 1; Michigan 1; Colorado 1; Washington 2; California 1.

Telegraphic morbidity reports from State health officers for the week ended Mar. 22, 1947, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Whooping cough: Week ended—Mar. 22, 1947	Whooping cough: Week ended—Mar. 23, 1946	Whooping cough: Median 1942–46	Week ended Mar. 22, 1947: Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis, infectious	Rocky Mt. spotted fever	Tularemia	Typhus fever, endemic	Undulant fever
NEW ENGLAND											
Maine	11	30	37								
New Hampshire	8		1	1							
Vermont	17	41	41								4
Massachusetts	171	100	232	1	3		1		1		
Rhode Island	14	36	36								
Connecticut	54	65	57								4
MIDDLE ATLANTIC											
New York	177	143	232	13	3						1
New Jersey	118	177	177								2
Pennsylvania	202	138	197								1
EAST NORTH CENTRAL											
Ohio	108	48	167								2
Indiana	46	17	17		1		3		1		3
Illinois	52	64	64	1					1	1	7
Michigan [1]	166	119	119								1
Wisconsin	107	95	95						1		7
WEST NORTH CENTRAL											
Minnesota	7	5	21								2
Iowa	18	18	18								15
Missouri	22	7	20						2		1
North Dakota			2								
South Dakota		1	1								
Nebraska	15		10								
Kansas	6	19	32								5
SOUTH ATLANTIC											
Delaware	4	2	3								
Maryland [1]	67	9	42								
District of Columbia	4	7	8								
Virginia	75	21	48			118			1		2
West Virginia	13	31	23								
North Carolina	36	59	152							2	
South Carolina	24	75	57	1	6					2	1
Georgia	8	11	19	1	4				11	6	4
Florida	25	11	20	4					1	9	2
EAST SOUTH CENTRAL											
Kentucky	9	20	31							1	
Tennessee	34	27	27				1		3		1
Alabama	67	6	25						5	6	4
Mississippi [1]	11									1	1
WEST SOUTH CENTRAL											
Arkansas	14	2	8	1	1				2		
Louisiana	3	2	2							2	
Oklahoma	14	5	12		2			1	1		
Texas	549	194	194	13	291	8				5	11
MOUNTAIN											
Montana		2	5								
Idaho	3	9	4					1			
Wyoming		2	7								
Colorado	21	39	32								1
New Mexico	1	11	8								1
Arizona	9	17	31			17	1				
Utah [1]	5	15	39								2
Nevada											
PACIFIC											
Washington	42	28	28	2							
Oregon	32	4	14	1							
California	191	90	319	3	3		1				8
Total	2,580	1,822	2,951	42	314	143	7	2	30	35	93
Same week, 1946	1,822			37	264	100	3	1	24	43	98
Median, 1942–46	2,951			35	194	45	11	0	14	38	[6] 95
12 weeks: 1947	30,499			546	4,054	2,679	81	12	468	543	1,205
1946	21,802			459	3,459	1,312	97	5	251	576	823
Median, 1942–46	29,090			324	2,462	745	97	4	226	576	[6] 919

[1] Period ended earlier than Saturday.

[6] 2-year average, 1945–46.

Anthrax: New Jersey 1 case.

WEEKLY REPORTS FROM CITIES [1]

City reports for week ended March 15, 1947

This table lists the reports from 88 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0	------	0	50	0	1	0	2	0	0	3
New Hampshire:												
Concord	0	0	------	0	------	0	0	0	2	0	0	------
Vermont:												
Barre	0	0	------	0	26	0	0	0	0	0	0	------
Massachusetts:												
Boston	16	0	------	0	44	0	8	0	20	0	1	39
Fall River	0	0	------	0	5	0	0	0	2	0	0	9
Springfield	0	0	------	0	10	0	1	0	4	0	0	7
Worcester	0	0	------	0	2	0	7	0	7	0	0	31
Rhode Island:												
Providence	0	1	------	0	178	0	1	0	5	0	0	9
Connecticut:												
Bridgeport	0	0	------	0	11	0	1	0	5	0	0	------
Hartford	0	0	------	0	50	0	2	0	2	0	0	1
New Haven	0	0	------	0	25	0	4	0	5	0	0	6
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0	1	0	1	0	8	0	12	0	1	2
New York	9	1	9	1	172	5	78	0	145	0	1	58
Rochester	0	0	------	0	1	0	6	0	10	0	0	2
Syracuse	0	0	------	0	------	1	2	0	6	0	0	11
New Jersey:												
Camden	5	0	------	0	------	0	0	0	1	0	0	------
Newark	0	0	3	0	8	0	4	0	16	0	0	18
Trenton	0	0	------	0	19	0	1	0	3	0	0	------
Pennsylvania:												
Philadelphia	2	0	3	1	27	1	22	0	36	0	0	34
Pittsburgh	0	0	6	0	64	1	7	0	24	0	0	8
Reading	0	0	------	0	2	0	0	0	6	0	0	3
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	1	0	------	0	------	0	7	0	10	0	0	3
Cleveland	1	0	9	0	412	1	3	0	26	0	0	14
Columbus	1	0	------	0	1	0	3	0	7	0	0	9
Indiana:												
Fort Wayne	0	0	------	0	18	0	4	0	7	0	0	------
Indianapolis	0	1	------	1	4	0	10	0	32	0	1	19
South Bend	0	0	2	0	------	0	0	0	1	0	0	------
Terre Haute	0	0	1	0	1	0	1	0	2	0	0	------
Illinois:												
Chicago	0	0	33	2	17	2	47	1	56	0	0	36
Michigan:												
Detroit	1	1	3	0	7	2	11	0	64	0	1	117
Flint	0	0	------	0	------	0	5	0	1	0	0	------
Grand Rapids	0	0	------	0	1	0	4	0	10	0	0	9
Wisconsin:												
Kenosha	0	0	------	0	------	0	0	0	2	0	0	7
Milwaukee	0	0	------	0	8	0	5	0	21	0	0	30
Racine	0	0	------	0	1	0	0	0	4	0	0	7
Superior	0	0	36	0	------	0	2	0	0	0	0	------
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0	------	0	------	1	0	0	0	0	0	1
Minneapolis	1	0	------	0	14	0	7	1	9	0	0	4
Missouri:												
Kansas City	0	0	33	2	1	0	14	0	12	0	1	2
St. Joseph	0	0	------	0	------	0	1	0	0	0	0	6
St. Louis	3	0	126	6	10	3	40	0	7	0	0	------

[1] In some instances the figures include nonresident cases.

City reports for week ended March 15, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
Nebraska:												
Omaha	0	0	------	4	------	0	8	0	1	0	0	------
Kansas:												
Topeka	0	0	1	0	1	0	0	0	1	0	0	6
Wichita	0	0	1	0	1	0	7	0	3	0	0	------
SOUTH ATLANTIC												
Delaware:												
Wilmington	1	0	------	0	1	0	0	0	5	0	0	------
Maryland:												
Baltimore	7	0	1	1	5	0	13	1	20	0	0	74
Cumberland	0	0	------	0	------	0	2	0	1	0	0	------
Frederick	0	0	------	0	------	0	0	0	0	0	0	------
District of Columbia:												
Washington	0	0	4	0	24	0	8	0	16	0	0	6
Virginia:												
Lynchburg	0	0	------	0	2	0	1	0	2	0	0	------
Richmond	0	0	1	1	81	0	9	0	1	0	0	------
Roanoke	0	0	------	0	2	0	0	0	7	0	0	2
West Virginia:												
Charleston	0	0	------	0	1	0	0	0	1	0	0	------
Wheeling	0	0	------	0	------	0	4	0	0	0	0	------
North Carolina:												
Raleigh	0	0	------	0	------	1	0	0	0	0	0	4
Wilmington	0	0	------	0	16	0	2	0	0	0	0	------
Winston Salem	0	0	------	0	41	0	3	0	2	0	0	2
South Carolina:												
Charleston	0	0	7	0	4	0	1	0	0	0	0	1
Georgia:												
Atlanta	0	0	217	0	9	0	5	0	1	0	0	1
Brunswick	0	0	------	0	------	0	0	0	0	0	0	------
Savannah	0	0	6	0	46	0	4	0	0	0	0	------
Florida:												
Tampa	1	0	------	0	1	1	4	0	6	0	0	1
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	0	0	------	2	3	0	10	0	4	0	0	8
Nashville	0	0	------	0	------	0	3	0	9	0	0	2
Alabama:												
Birmingham	0	0	26	0	19	0	7	0	2	0	1	------
Mobile	0	0	3	1	20	0	1	0	1	0	0	2
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	7	0	4	1	0	0	1	0	0	1
Louisiana:												
New Orleans	10	0	6	0	55	5	9	2	3	0	2	------
Shreveport	0	0	------	0	------	0	1	0	0	0	0	------
Oklahoma:												
Oklahoma City	0	0	71	0	1	0	4	0	7	0	0	4
Texas:												
Dallas	0	0	5	1	16	0	9	0	2	0	0	13
Galveston	1	0	------	0	------	1	0	0	0	0	0	------
Houston	3	0	------	1	------	0	5	0	2	0	0	1
San Antonio	1	0	34	8	8	0	10	0	0	0	0	------
MOUNTAIN												
Montana:												
Billings	0	0	------	0	------	0	1	0	0	0	0	------
Great Falls	0	0	------	0	76	0	1	0	0	0	0	------
Helena	0	0	------	0	1	0	2	0	0	0	0	------
Missoula	0	0	------	0	------	0	1	0	0	0	0	------
Idaho:												
Boise	0	0	------	0	------	0	1	0	1	0	0	2
Colorado:												
Denver	2	0	14	1	17	0	7	0	25	0	0	1
Pueblo	0	0	------	0	------	0	6	0	6	0	0	------
Utah:												
Salt Lake City	0	0	------	0	5	0	1	0	4	0	0	1

City reports for week ended March 15, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza: Cases	Influenza: Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
PACIFIC												
Washington:												
Seattle	0	0	------	0	2	1	2	0	11	0	0	------
Spokane	0	0	------	0	7	0	4	0	2	0	0	2
Tacoma	0	0	------	0	5	1	0	0	0	0	0	------
California:												
Los Angeles	4	0	3	0	5	2	3	0	30	0	0	25
Sacramento	0	0	------	0	1	0	6	1	2	0	0	3
San Francisco	2	0	2	0	10	0	6	0	14	0	1	------
Total	72	4	674	33	1,680	30	488	6	777	0	10	667
Corresponding week, 1946*	78	------	105	80	11,233	------	379	------	1,105	4	10	410
Average 1942–46*	67	------	148	[2] 82	[3] 6,292	------	[2] 435	------	1,733	1	11	714

[2] 3-year average, 1944–46.
[3] 5-year median, 1942–46.
*Exclusive of Oklahoma City.

Dysentery, amebic.—Cases: New York 6; Chicago 4.
Dysentery, bacillary.—Cases: Worcester 1; New York 2.
Dysentery, unspecified.—Cases: Baltimore 1; Richmond 1; Little Rock 1; Houston 1; San Antonio 2.
Tularemia.—Cases New Orleans 4.
Typhus fever, endemic.—Cases: Charleston, S. C., 1 (imported from Cuba); Tampa 1; New Orleans 4.

Rates (annual basis) per 100,000 population, by geographic groups, for the 88 cities in the preceding table (latest available estimated population, 1943, 34,250,600)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza: Case rates	Influenza: Death rates	Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
New England	41.8	2.6	0.0	0.0	1,048	0.0	65.3	0.0	141	0.0	2.6	274
Middle Atlantic	7.4	0.5	10.2	0.9	136	3.7	59.2	0.0	120	0.0	0.9	63
East North Central	2.5	1.2	51.5	1.8	288	3.1	62.6	0.6	149	0.0	1.2	154
West North Central	9.0	0.0	362.8	27.0	61	9.0	173.5	2.3	74	0.0	2.3	43
South Atlantic	14.7	0.0	385.7	3.3	381	3.3	91.5	1.6	101	0.0	0.0	149
East South Central	0.0	0.0	171.2	17.7	248	0.0	123.9	0.0	94	0.0	5.9	71
West South Central	38.1	0.0	312.4	25.4	213	17.8	96.5	5.1	38	0.0	5.1	48
Mountain	15.9	0.0	111.2	7.9	786	0.0	158.9	0.0	286	0.0	0.0	32
Pacific	9.5	0.0	7.9	0.0	47	6.3	33.2	1.6	93	0.0	1.6	47
Total	11.0	0.6	102.9	5.0	256	4.6	74.5	0.9	119	0.0	1.5	102

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended March 1, 1947.—During the week ended March 1, 1947, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		41	5	327	348	32	22	94	126	995
Diphtheria		1		20	3	2	1			27
Dysentery, amebic					1					1
Encephalitis, infectious					1					1
German measles		1		39	87	3	2	26	5	163
Influenza		98			25				128	251
Measles		105	23	124	172	421	80	245	519	1,689
Meningitis, meningococcus				2				1		3
Mumps		4		174	549	111	130	35	177	1,180
Poliomyelitis					2					2
Scarlet fever	2	3	5	90	77	4		5	12	198
Tuberculosis (all forms)		7	12	166	22	13		32		252
Typhoid and paratyphoid fever		1		5	1		1		1	9
Undulant fever				1	1			1		3
Venereal diseases:										
Gonorrhea	2	20	9	106	92	36	26	44	67	402
Syphilis	3	2	4	73	75	8	15	8	47	235
Other forms									4	4
Whooping cough		19		40	115	27	3	4	27	235

CUBA

Habana—Communicable diseases—4 weeks ended February 22, 1947.—During the 4 weeks ended February 22, 1947, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Chickenpox	3		Poliomyelitis	2	
Diphtheria	23	1	Tuberculosis	6	6
Malaria	1		Typhoid fever	74	2
Measles	20				

Provinces—Notifiable diseases—4 weeks ended February 22, 1947.—During the 4 weeks ended February 22, 1947, cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana [1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer	8	16	17	19	-	19	79
Chickenpox	-	3	-	-	1	1	5
Diphtheria	1	26	3	-	-	1	31
Hookworm disease	-	13	-	1	-	-	14
Leprosy	-	6	-	-	-	2	8
Malaria	5	2	-	2	5	55	69
Measles	12	24	1	-	3	2	42
Poliomyelitis	2	3	-	1	1	4	11
Tuberculosis	60	38	14	40	14	29	195
Typhoid fever	6	103	7	10	3	47	176
Undulant fever	-	-	-	-	1	-	1
Whooping cough	1	11	-	-	1	1	14
Yaws	-	-	-	-	-	1	1

[1] Includes the city of Habana.

JAPAN

Notifiable diseases—4 weeks ended February 22, 1947, and accumulated totals for the year to date.—For the 4 weeks ended February 22, 1947, and for the year to date, certain notifiable diseases have been reported in Japan as follows:

Disease	4 weeks ended February 22, 1947		Total reported for the year to date	
	Cases	Deaths	Cases	Deaths
Diphtheria	2,662	307	5,472	569
Dysentery, unspecified	229	45	461	111
Encephalitis, Japanese "B"	-	-	1	2
Gonorrhea	14,306	-	26,062	-
Malaria	581	4	1,216	5
Meningitis, epidemic	282	82	435	112
Paratyphoid fever	185	15	409	26
Scarlet fever	175	7	357	8
Smallpox	49	6	116	11
Syphilis	9,634	-	16,525	-
Typhoid fever	828	141	1,928	251
Typhus fever	155	17	395	30

NORWAY

Notifiable diseases—November 1946.—During the month of November 1946, cases of certain notifiable diseases were reported in Norway as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	11	Paratyphoid fever	15
Diphtheria	261	Pneumonia (all forms)	1,927
Dysentery, unspecified	5	Poliomyelitis	63
Encephalitis, epidemic	9	Rheumatic fever	150
Erysipelas	563	Scabies	5,807
Gastroenteritis	2,865	Scarlet fever	646
Gonorrhea	915	Syphilis	160
Hepatitis, epidemic	564	Tuberculosis (all forms)	420
Impetigo contagiosa	4,859	Typhoid fever	7
Influenza	2,650	Undulant fever	1
Malaria	2	Weil's disease	2
Measles	150	Whooping cough	2,766
Mumps	281		

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Plague

Union of South Africa.—For the week ended March 8, 1947, 7 cases of plague were reported in the Union of South Africa, no specific location being given.

Smallpox

Egypt—Alexandria.—For the week ended February 22, 1947, 12 cases of smallpox were reported in Alexandria, Egypt.

France—Paris.—For the week ended March 15, 1947, 6 cases of smallpox with 1 death were reported in Paris, France, making a total of 11 cases and 1 death since March 1.

India—Calcutta.—Smallpox has been reported in Calcutta, India, as follows: Weeks ended—February 22, 1947, 84 cases, 59 deaths; March 1, 1947, 86 cases, 64 deaths.

DEATHS DURING WEEK ENDED MAR. 15, 1947

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Mar. 15, 1947	Corresponding week, 1946
Data for 93 large cities of the United States:		
Total deaths	10,310	9,267
Median for 3 prior years	9,532	
Total deaths, first 11 weeks of year	110,460	113,546
Deaths under 1 year of age	777	590
Median for 3 prior years	663	
Deaths under 1 year of age, first 11 weeks of year	9,010	6,671
Data from industrial insurance companies:		
Policies in force	67,430,187	67,189,619
Number of death claims	12,148	15,222
Death claims per 1,000 policies in force, annual rate	9.4	11.8
Death claims per 1,000 policies, first 11 weeks of year, annual rate	9.8	11.4

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Public Health Reports

VOLUME 62 APRIL 18, 1947 NUMBER 16

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INCIDENCE OF DISEASE

Public Health Reports

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AN IMPROVED METHOD OF PRODUCING SMALLPOX VACCINE OF LOW BACTERIAL CONTENT

PART I. GENERAL METHODS OF PRODUCTION—INCLUDING DESCRIPTION OF QUARTERS, EQUIPMENT AND PROCEDURES

By D. H. Ducor, D. V. M., *Bureau of Laboratories, Michigan Department of Health*

In the more than 147 years since Jenner described his method of preventive inoculation against smallpox, there has been no essential change in the preparation of smallpox vaccine derived from the calf. Such modifications of technique as have been introduced have been directed toward the production of a better and a safer vaccine. A survey of the literature reveals a widespread desire to obtain a vaccine free from extraneous organisms and yet of sufficient potency to produce satisfactory immunity in human beings.

Owing to the fact that the virus of vaccinia is cultivated on the open skin surface of the calf, it has been impossible to produce a vaccine entirely free of micro-organisms. In recognition of this limitation of calf-propagated smallpox vaccine, National Institute of Health regulations permit the finished vaccine to contain a maximum of 1,000 viable nonpathogenic organisms per milliliter.

This shortcoming of calf vaccine has led to the development of methods for cultivating bacteria-free vaccinia virus in tissue culture (*1*), and in the developing chick embryo. Woodruff and Goodpasture (*2*) reported that the chorio-allantoic membranes of chick embryos were susceptible to infection with fowlpox virus and later, in collaboration with Buddingh (*3*), described a method of cultivating vaccinia virus on the same membranes. Despite the claims made for such types of vaccine, calf-propagated smallpox vaccine remains the most widely used prophylactic agent against smallpox. It has behind it a long and successful record of millions of effective vaccinations and a reputation for dependability which cannot be ignored. It is the purpose of this paper to describe a method of producing calf-propa-

gated smallpox vaccine of unusually low bacterial count, together with a description of the physical plant and equipment used in production.

QUARTERS AND EQUIPMENT

The smallpox vaccine building is a complete and self-contained production unit (fig. 1). The type of building construction and room arrangement provides optimum facilities for the maintenance of strict hygienic conditions. The walls are constructed of double-faced glazed tile bricks, and the floors are of smooth sealed cement, providing excellent drainage.

Animal preparation room.—The animal preparation room is the receiving room in which incoming calves are prepared for quarantine. Facilities are provided for restraining, clipping, and bathing the animal.

Quarantine and incubation rooms.—The quarantine and incubation rooms are identical in construction. Each contains six stanchions, a concrete manger, and a device for automatically flushing the gutters at frequent intervals (fig. 2).

Operating room.—The operating room contains a "Blaxall" operating table, an instrument sterilizer, and cabinets for the storage of sterile supplies and instruments. Facilities are provided for furnishing tap water of any desired temperature as well as for sterile tap water (fig. 3).

Autopsy room.—The autopsy room contains an autoclave, tanks for sterilizing tap water, sanitary laundry sinks, and equipment for suspending the animal carcass during autopsy. Mechanical ventilation provides rapidly changing filtered air of constant temperature in all the above-mentioned rooms.

Feed storage rooms.—Two feed storage rooms are provided for convenience. The one serving the incubation room contains a large autoclave in which soiled floor gratings and materials used in the operating room are disinfected.

Processing laboratory.—The processing laboratory contains equipment for the processing, testing, and storage of vaccine, including a 37° C. incubator, a 2° C. refrigerator, and a −18° C. freezer.

Animal test room.—The animal test room is isolated from the rest of the unit by a permanent wall and has a separate entrance. It is equipped with cages for rabbits, cages for mice, and a work table upon which rabbits may be restrained.

VACCINE PRODUCTION PROCEDURES

Preparation of calves for quarantine.—Heifer calves with white abdomens, weighing from 300 to 400 pounds, are preferred in our work.

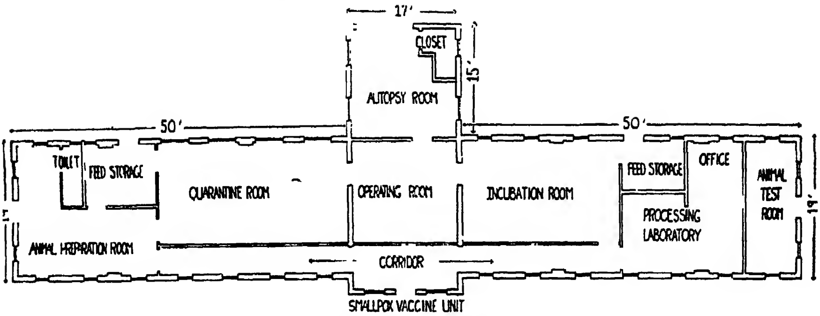

FIGURE 1.—Floor plan of building used for production of smallpox vaccine.

FIGURE 2.—Quarantine and isolation room.

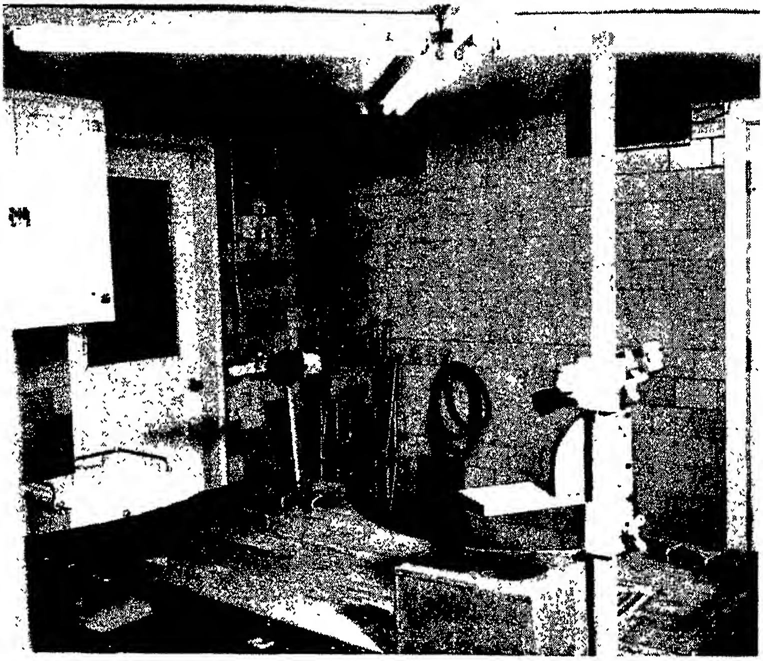

FIGURE 3.—Operating room.

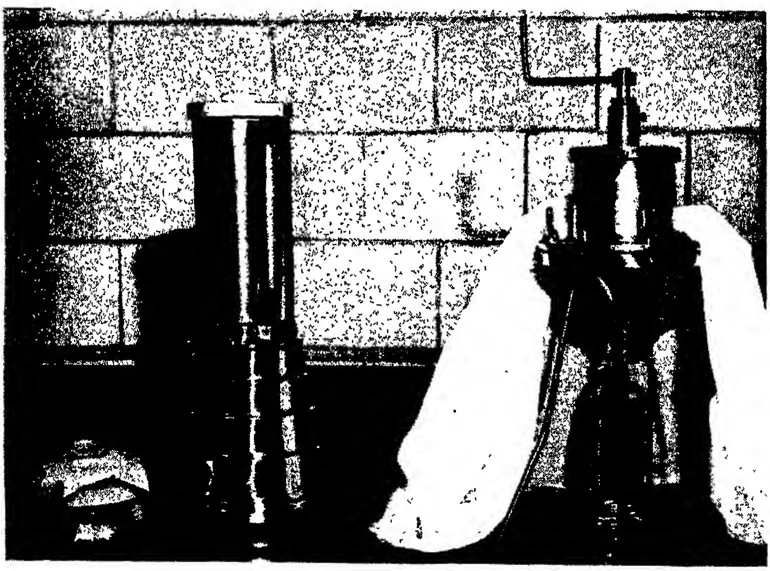

FIGURE 4.—Grinder and screener. Left to right: Frozen vaccinial pulp, Waring Blendor, and screener.

In the animal preparation room, the calf is closely clipped with electric hair clippers and bathed with soap and warm water. The hooves are trimmed and cleaned, and the animal is dried with towels before it is placed in the quarantine room.

Quarantine and care of calves.—The calves are kept in quarantine at least 1 week. During this period, rectal temperatures are taken and recorded twice daily. An intradermic tuberculin test is performed in the skin of the caudal fold, the reaction being judged on the third day. Positive tuberculin reactors and animals showing any evidence of disease during the quarantine period are rejected. In our experience, the most common ailment in calves has been respiratory in nature and varied in severity from a mild cold to pneumonia. These difficulties appear to be minimized if the room temperature is maintained constantly between 82° F. and 85° F. The calves are fed twice daily. The ration consists of 1½ quarts of rolled oats and a quantity of alfalfa hay which can be consumed by the animal at each feeding. A bucket of clean fresh water is kept before each animal at all times.

Sanitation.—Each calf is placed in an individual stanchion equipped with a removable wooden floor grating. A minimum of two stanchions for each animal should be available. This permits changing the calves from soiled to clean stanchions at frequent intervals. The soiled floor gratings are removed daily, scrubbed in hot water, and sterilized in the autoclave. Each day the stanchions are cleaned thoroughly with hot water and disinfected with a reliable chlorine disinfectant. Twice daily the rooms are washed with running water, and chlorine disinfectant is applied to the walls and floors with a long-handled brush.

Preparation of the calf for vaccination.—The calf is strapped on the table and anesthetized with sodium pentobarbital solution. This is used as a 6.4-percent solution and is administered slowly through the jugular, allowing 1 ml. for each 15 lb. of body weight. Satisfactory relaxation is quickly produced with this dosage, which is the equivalent of 1 grain per 15 lb. Additional anesthetic may be given as the need arises. An electric clipper fitted with a fine cutting blade is used to clip the hair from the ventral surface of the body, the right side, and the inside surfaces of the thighs. The animal is given a preliminary bath followed by careful shaving of the freshly clipped area which is to be used for inoculation. The inoculation site, including a liberal area surrounding it, is then scrubbed with sterile soap solution [1] employing sterile hand brushes. The soap solution is rinsed from the animal with warm tap water. This procedure is repeated at least six times. A final rinsing is made with sterile tap water. The skin

[1] One part Ivory soap chips plus two parts water are put up in 16-oz. bottles and sterilized in the autoclave.

is dried with sterile towels, and 70-percent alcohol is applied and permitted to dry. The area is rinsed with sterile distilled water, dried, and draped with sterile towels, leaving only the inoculation site exposed.

Vaccination procedure.—With the four-point scarifying instrument (fig. 5) held perpendicular to the skin and with the application of slight pressure, parallel lines are drawn about 0.5 cm. apart following the long axis of the body. Sufficient pressure is used to break the skin without drawing blood. The seed suspension is applied and rubbed into the skin with a sterile spatula. When the animal has recovered from the anesthetic, it is removed to the incubation room for a period of 6 days.

Incubation.—The sanitation and care of the calves in the incubation room are, in general, the same as those employed in the quarantine room, with the exception that the inoculated area of each calf is sprayed twice daily with 1:1,000 aqueous solution of Roccal.[2] The hay and grain are steam treated in order to render them dust free. The windows of this room are of ruby glass in order to screen out direct sunlight. It has been reported that ultraviolet light has an inhibitory effect on the development of the pox lesion (*4*).

Collection of the vaccinial pulp.—The vaccinial pulp is collected from the calf on the sixth day of incubation. The animal is placed on the table and anesthetized as previously described. Aseptic procedure is followed in collecting the pulp. This includes the use of sterile gowns and sterile rubber gloves by the operator. The vaccinated area is cleansed by scrubbing it thoroughly with sterile soap solution and by rinsing with warm tap water. This is repeated 10 or 12 times using sterile hand brushes for each application. Extreme care is taken to cover the entire field of operation in a systematic progression, with the avoidance of injury to the vesicles. If after five or six scrubbings the vesicles appear to soften excessively, the brushes are discarded and the gloved hands alone are used to work up the lather. An assistant rinses off the soap between scrubbings while the operator soaks his gloved hands in a basin of 1:1,000 aqueous solution of Roccal. After the last washing the calf is rinsed with sterile tap water, which is followed by 95-percent alcohol to remove all traces of soap. The area is rinsed again with sterile tap water and dried with a sterile towel. By means of a hand-operated spray gun, the operative field is sprayed with a 1:100 aqueous solution of Roccal until it is thoroughly wet. It is then covered with a sterile towel for 15 minutes.

[2] Made by the Roccal-Winthrop Chemical Co. It is available as a 10-percent stock solution. Solutions of Roccal referred to in this report are in terms of the concentration of the active ingredient; to make one liter of 1:1,000 solution of Roccal, 10 ml. of Roccal stock solution are added to 990 ml. distilled water.

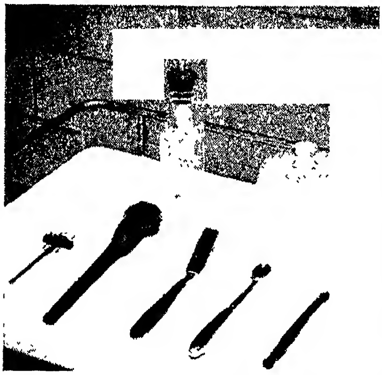

FIGURE 5.—Scarification and harvest instruments. Bottom row, left to right: Four-point scarifier, pricking instrument, spatula, curette (Volkmann spoon), and pick (used in removing pulp from curette). Top row, left to right: Seed-dispensing bottle, and vaccine-collecting jar.

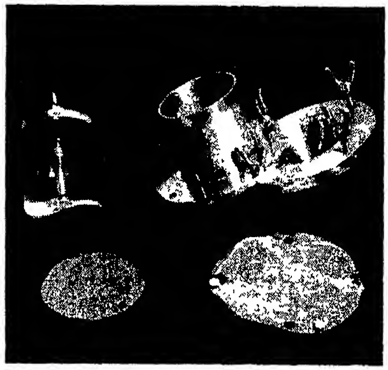

FIGURE 6.—Screening device taken apart to show its construction. In the lower row are shown the coarse mesh supporting screen and the 100-mesh monel wire screen which fits over it.

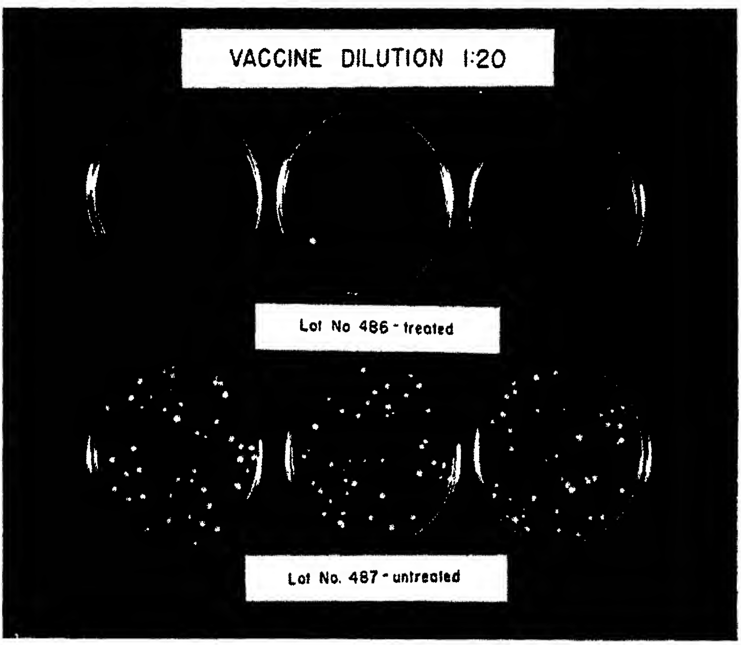

FIGURE 7.—Agar plate counts of vaccine prepared from Roccal-treated calves and untreated calves.

The calf is sacrificed at this time by trocarization of the carotid artery. The operative area is rinsed with sterile tap water followed by sterile distilled water. The surface is dried and then draped with sterile towels, leaving only the vaccinated site exposed. Vaccinial pulp is collected by scraping the vesicles with a Volkman spoon, and the material is placed in a sterile, tared, glass-covered dish. When collection is completed, the pulp is removed to the processing laboratory where it is weighed and stored in the freezer to await processing.

Autopsy.—Immediately after harvesting, a systematic gross inspection is made of the carcass and the viscera, including the regional lymph nodes. The vaccinial pulp of any animal showing evidence of sepsis or a communicable disease is discarded.

Preparation of the vaccine.—The frozen vaccinial pulp is transferred to a sterile "Waring Blendor" cup (fig. 4) and ground to a smooth consistency with the addition of 50 percent glycerine in distilled water. A sample of this material is removed for future testing, and to the remainder a quantity of glycerine-phenol solution is added to make a 1:4 suspension of vaccinial pulp. (One part pulp to three parts phenolized 50-percent glycerine in distilled water. The final concentration of phenol is 0.5 percent.) When the grinding is completed, the suspension is passed through a 100-mesh wire screen and collected in sterile 16-ounce bottles (fig. 6). This material, constituting the bulk vaccine, is stored at −18° C.

Safety and potency tests.—Before vaccine virus is released for filling, tests are conducted to show that the bacterial content is satisfactory, that it is free of *Clostridium tetani*, and that it is of sufficient potency.

Bacterial content.—For the determination of bacterial content, the nutrient agar plate-count method is used. A 1:20 dilution of the vaccine is made with saline and 1-ml. amounts are added to each of five plates. The average count multiplied by the dilution factor is used to obtain the number of organisms per milliliter. Plate counts are made on the fresh vaccine and repeated at monthly intervals, if necessary, until the bacterial count is acceptable. National Institute of Health regulations permit a maximum bacterial count of 1,000 organisms per milliliter of the finished vaccine. With the method herein described, the initial plate counts are usually less than 50 organisms per milliliter.

Test for Clostridium tetani.—The test for *Clostridium tetani* is made on the ground glycerinated pulp which was removed as a sample before the vaccine was phenolized. Samples from each calf are tested separately. Fermentation tubes containing media suitable for the growth of anaerobic bacteria are inoculated with 2-ml. amounts of vaccine. The inoculated tubes are incubated at 37° C. for 9

days, after which 1-ml. amounts of unfiltered broth from each tube are injected subcutaneously into mice. The mice are observed for symptoms of tetanus for a period of 6 days.

Determination of the potency of vaccine virus.—Potency tests are performed on the bulk vaccine and on the vaccine filled in capillary tubes. The technique used is that described by Force and Leake (*5*) in which the rabbit is employed as the test animal. Bulk vaccine is tested against a control vaccine of known potency using the following dilutions: 1:1,000, 1:3,000, 1:10,000, 1:30,000. Vaccine in capillaries is tested against a control vaccine in a dilution of 1:3,000. A vaccine is considered satisfactory for release if on the fifth day it produces 80-percent confluence of vesicles in a 1:3,000 dilution.

Seed virus.—Seed virus for the following year is prepared at the close of each production season. The seed virus is maintained at a high level of potency by alternate passage through a rabbit and a calf. Several large albino rabbits weighing from 7 to 10 pounds are used as vaccinifers. The entire surface of the back is plucked free of hair. Preparation of the skin and the technique used in vaccination of the rabbits is similar to that described for the calf. The skin over the back is scarified with an instrument containing four needles set 1 mm. apart. Calf vaccine diluted with an equal volume of 50-percent glycerine is then rubbed into the scarifications with a spatula. On the fifth day after inoculation, the vesicles are ready for harvesting. The rabbits are sacrificed by an intravenous injection of a lethal dose of a 6.4-percent solution of sodium pentobarbital. Usually 3 to 5 ml. is sufficient. Aseptic technique is observed in preparation of the erupted skin surface for collection of the pulp, which in general follows the procedure used when harvesting from the calf.

The vaccinial pulp is processed in the same manner as previously described for calf vaccine, except that the dilution of the suspension is 1:8 rather than 1:4. If the quantity of pulp is small, the grinding may be performed in a mortar with pestle. Tests are performed for bacterial content, *Clostridium tetani*, and for potency, following which the lapine virus is used to vaccinate a calf. The vaccine resulting from the vaccination of the calf is set aside as seed virus. The processing, testing, and standards are the same as for regular smallpox vaccine.

Storage of vaccine.—Optimum conditions of storage for smallpox vaccine are not clearly established. We have stored vaccine for 3 years at or below −10° C. with only slight loss of potency. For the past 2 years we have stored vaccine at −18° C. The hydrogen ion concentration of our smallpox vaccine ranges from 6.6 to 7.2 tending toward the lower value after prolonged storage.

DISCUSSION

There are several features of the construction of the smallpox unit which deserve additional comment. In the manufacture of calf-propagated smallpox vaccine, the prevention of heavy contamination of the final product with extraneous micro-organisms has always been a great problem. The usual source of this contamination is, of course, the skin of the animal. Therefore, any effort made to keep to a minimum the contamination of the animal's skin prior to collection of the vaccinial pulp will result in fewer organisms in the final vaccine. Complete elimination of all micro-organisms from the surface of the skin is probably impossible. By having fewer organisms to cope with, however, the operator can more nearly attain the goal of complete skin disinfection at the time of harvest. By providing easily cleaned quarters with reserve stanchion capacity, the animals can be alternated daily in freshly cleaned stanchions while others are sanitized. This is of great importance when attempting to control such bacterial contaminants as *Pseudomonas pyocyaneous*. Another important feature in the animal quarters is the installation of a flushing device for washing the gutters at frequent intervals. Such an arrangement helps to prevent the accumulation of feces and urine in the stanchion behind the animal and reduces the chance for fecal soilage of the skin surfaces. Animal attendants must be on the alert constantly to maintain the most rigid kind of sanitation.

Of the many steps employed in the production of vaccine, the techniques used in the operating room are perhaps of most importance. Good operating room procedure demands attention to small detail as well as to the obvious. The task of preparing for operation an animal as large and vigorous as a 350-pound calf is subject to many difficulties. Animals object to restraint, and their cooperation may only be obtained through the use of some relaxing agent. Although it is the practice of some vaccine laboratories to vaccinate an unanesthetized animal, it is felt that the advantages of using an anesthetic greatly outweigh any disadvantages. There are a number of safe anesthetics such as sodium pentobarbital which are easy to administer and require little attention on the part of the operator. In addition to humane considerations, an anesthetized animal makes possible the use of good aseptic technique.

One of the details which must be kept in mind when preparing an animal for either inoculation or harvest is prevention of contamination of the operative field from some object which has been in contact with an unclean surface. This, of course, is fundamental to any aseptic procedure, but it is surprising how many opportunities exist for breaking the chain of asepsis. To minimize the chances for contami-

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nation of the field, scrubbings are begun centrally in the operative area and progress outwardly in ever-increasing circles. Brushes that have been in contact with the outer limits of the operative field are never brought back again to the central area but are discarded. The same principle is followed when rinsing the area. The direction of water flow is from the center of the operative area out to the edges, care being taken to prevent backflow over the clean surface.

The uniform incubation period of vaccinia in the calf makes the production procedure adaptable to easy scheduling. A staff consisting of the following classes of personnel is recommended: One veterinarian, one laboratory technician, one operating room assistant, and one animal technician. A production unit such as is described in this report is capable of producing from 1 to 3 million capillaries in a 40-week period, depending on whether two or six calves are harvested each week. To obtain the larger volume of production would necessitate a slight increase in the size of the quarantine, operating, and incubation rooms, and the addition of extra personnel.

SUMMARY OF PART I

An improved method for the manufacture of smallpox vaccine of low bacterial content is described. Rigid attention to the details of sanitation during the quarantine and handling of animals, together with the treatment of operative surfaces with Roccal solution, constitute the improvements. With these improvements, it is possible to eliminate the long storage period otherwise required for the destruction of bacterial contaminants in the vaccine.

PART II. COMPARISON OF A QUATERNARY AMMONIUM COMPOUND (ROCCAL)[3] WITH BRILLIANT GREEN IN THE PREPARATION OF SMALLPOX VACCINE

The present study was undertaken in an effort to discover some means for overcoming the main criticism of calf vaccine, namely, that of massive contamination of the product with extraneous micro-organisms. Such contamination makes necessary a more or less long "ripening" process in the manufacturer's cold storage rooms before the vaccine may be released for use.

Many agents have been tried in the past to reduce the number of viable micro-organisms appearing in smallpox vaccine. Among these may be mentioned chloroform, ether, phenol, eucopintoxin hydrochloride, trypaflavine, malachite green, brilliant green (*6*), oil of cloves, and heat.

[3] Made by the Roccal-Winthrop Chemical Co., New York. It is prepared as a 10-percent stock solution of the active ingredient. Dilutions herein referred to indicate concentration of active ingredient rather than dilution of Roccal solution. To make one liter of 1:100 solution of Roccal, 100 ml. of Roccal stock solution are added to 900 ml. of distilled water.

None of these agents has been effective in reducing the bacterial content of smallpox vaccine without at the same time causing injury to the virus. Glycerine, the most commonly used suspending medium for vaccine virus, is a feeble germicide at low temperatures and requires a rather long period to produce a sufficient reduction in contaminating bacteria. At room temperature (20° C.) or higher, the rate of bacterial destruction is accelerated, but unfortunately there is rapid destruction of the virus at that temperature.

Brilliant green in concentrations of 1:500 to 1:1,000 has been used widely as a spray applied to the inoculated skin surface of the calf during the incubation of vaccinia. Its purpose was to control the number of organisms occurring on the skin of the animal.

Our own experience with the use of brilliant green in the above manner indicated that it was not an effective agent. Initial bacterial counts on individual lots of vaccine averaged more than 12,000 organisms per milliliter. Such vaccine frequently required a year or more of storage in the freezer at −15° C. to −18° C. before the bacterial count was lowered sufficiently for safe usage. A lot of vaccine is considered satisfactory if its bacterial count does not exceed 1,000 organisms per milliliter.

The need for producing a vaccine on the skin surface of an animal with the avoidance of undue bacterial contamination of the product is very great. An agent which could be applied to the animal's skin and which could effectively control the numbers of micro-organisms would be of value in the manufacture of high-quality smallpox vaccine. Such an agent should have the following properties:

1. High germicidal activity.
2. Low toxicity for the virus.
3. Low surface tension to ensure good skin contact.
4. Low toxicity for skin tissue.
5. Ease of application.

The compound employed in this study (Roccal)[3] possesses the above properties. Roccal is a quaternary ammonium compound derived from coconut oil. It is a mixture of high-molecular-weight alkyl-dimethyl-benzyl-ammonium chlorides The aqueous solution is a stable, colorless, saponaceous, alkaline solution which has an acrid taste. When diluted for topical application, the aqueous solution possesses wetting, detergent, keratolytic, emulsifying, and emollient properties.

Critical toxicity tests (7) have shown this compound to have no harmful effect upon the skin and mucous membranes when used in proper dilution.

METHODS

Part I discussed in detail the procedures employed in the manufacture of smallpox vaccine. The germicides compared in this study were brilliant green 1:500 solution, Roccal 1:1,000 solution, and Roccal 1:100 solution. These agents were sprayed on the skin of the calf during the incubation of vaccinia. In the case of Roccal solution, an additional spraying was made just prior to harvesting the vaccinial pulp. The resultant effect on the bacterial content, potency, and yield of vaccine was studied.

RESULTS

Prior to the use of Roccal, an aqueous solution of brilliant green in a concentration of 1:500 had been used in the form of a spray. This was applied twice a day to the inoculation site during the incubation period of vaccinia. It is obvious that the care and technique of the operator at the time of harvest will greatly influence the bacterial content of the vaccinial pulp. In the tables presented, the separate lots of vaccine were prepared by or under the direction of one individual, thereby minimizing an important variable.

TABLE 1.—*Comparison of vaccine from calves treated with brilliant green 1:500 and with Roccal 1:1,000*

Method of treatment of calves	Lot number	Time between harvest and first bacterial count (in days)	Bacterial count (number per milliliter)	Method of treatment of calves	Lot number	Time between harvest and first bacterial count (in days)	Bacterial count (number per milliliter)
Brilliant green 1:500	413	9	3,000	Roccal 1:1,000	424	54	1,000
Brilliant green 1:500	414	6	14,500	Brilliant green 1:500	425	53	[1]>20,000
Brilliant green 1:500	416	69	1,900	Brilliant green 1:500	426	50	6,000
Brilliant green 1:500	417	65	17,600	Roccal 1:1,000	427	47	1,150
Brilliant green 1:500	418	62	1,000	Roccal 1:1,000	428	56	500
Brilliant green 1:500	419	58	7,500	Brilliant green 1:500	429	53	18,000
Brilliant green 1:500	420	5	[1]>20,000	Brilliant green 1:500	430	49	[1]>20,000
Roccal 1:1,000	421	1	300	Brilliant green 1:500	Average	43.5	>12,000
Roccal 1:1,000	422	68	150	Roccal 1:1,000	Average	47.3	566
Roccal 1:1,000	423	58	300				

[1] No attempt was made to determine the number of micro-organisms in vaccine showing counts in excess of 20,000 per milliliter. Such vaccine is recorded in the table as having counts of 20,000 per milliliter in order to arrive at an approximate average figure for the series. Actually the average figure is higher than that indicated.

The data summarized in table 1 are from a series of lots of vaccine produced both by the old method of treatment of the calves with brilliant green 1:500 solution and by the method employing Roccal 1:1,000 aqueous solution. The data obtained in 17 consecutive lots of vaccine are presented. Eleven calves were treated with brilliant green, and six with Roccal. The lower bacterial content in the case

of Roccal-treated vaccine[4] is apparent when compared with the brilliant-green-treated vaccine.[4] Lot 415 is omitted because it was produced by another individual.

The average initial bacterial count in the 11 lots of vaccine treated with brilliant green 1:500 was 12,000 per milliliter. The average initial count in the 6 lots of vaccine treated with Roccal 1:1,000 was 566 per milliliter. The average time interval between preparation of the vaccine and making the bacterial counts was 43.5 days for the brilliant-green-treated vaccine, and 47.3 days for the Roccal-treated vaccine. All vaccine was kept in continuous cold storage at −10° C. to −18° C.

Effect of Roccal 1:1,000 solution on the potency of vaccinia virus.—Some chemical agents, although effective bactericides, carry with them the concurrent danger either of immediately diminishing the potency of the virus or of shortening its period of usefulness.

To determine whether or not Roccal, in the dilution used, had any destructive action on the virus, the Roccal-treated vaccine was tested for potency after varying periods and conditions of storage.

Lot No. 423 Roccal-treated vaccine was compared with lot No. 426 brilliant-green-treated vaccine after 8 months of continuous storage at −10° C. to −18° C. The results are shown in table 2.

After 18 months of continuous storage at −10° C. to −18° C., lot No. 424 Roccal-treated vaccine was compared with lot No. 425 brilliant-green-treated vaccine.

TABLE 2.—*Comparison of the potency of vaccine from Roccal-treated and brilliant-green-treated calves after 8 months of cold storage*

Dilution of vaccine	Percentage confluence [1]		Dilution of vaccine	Percentage confluence [1]	
	Lot No. 423 Roccal-treated	Lot No. 426 brilliant-green-treated		Lot No. 423 Roccal-treated	Lot No. 426 brilliant-green-treated
1:1,000	100	100	1:10,000	100	100
1:3,000	100	100	1:30,000	100	100

[1] Percentage confluence refers to percentage of inoculated area covered with a confluent eruption of vesicles, using the rabbit as the test animal. The technique of testing was that described by Force and Leake (*5*).

TABLE 3.—*Comparison of the potency of vaccine from Roccal-treated and brilliant-green-treated calves after 18 months of cold storage*

Dilution of vaccine	Percentage confluence		Dilution of vaccine	Percentage confluence	
	Lot No. 424 Roccal-treated	Lot No. 425 brilliant-green-treated		Lot No. 424 Roccal-treated	Lot No. 425 brilliant-green-treated
1:1,000	100	100	1:10,000	75	60
1:3,000	100	95	1:30,000	40	40

[4] The terms Roccal-treated vaccine and brilliant-green-treated vaccine imply treatment of the operative surfaces of the calves rather than direct treatment of the vaccinial material after its removal from the animals.

From the above tables, it would appear that after 8 and after 18 months of storage at a temperature below −10° C., there is no appreciable difference in virus potency exhibited by the Roccal-treated and the brilliant-green-treated vaccines.

Effect of room temperature on vaccine from Roccal-treated calves.—To ascertain if storage at room temperature would reveal any latent effect of Roccal on vaccinia virus, the following experiment was conducted.

A calf was prepared for harvest in the usual manner. Just prior to collection of the pulp, one-half of the erupted area was covered with a sterile sheet, and the other half was sprayed with 1:1,000 aqueous solution of Roccal. After 10 minutes, this area was rinsed with sterile distilled water and dried with a sterile towel. The vaccinial pulp was collected separately from the treated and untreated areas. The untreated vaccine, lot No. 454A, was processed separately from the Roccal-treated vaccine, lot No. 454C.

The potencies of lots No. 454A and No. 454C, after varying periods of storage at room temperature, were determined by animal titration (table 4). It was interesting to observe that 11 days after preparation of the vaccines, the bacterial count of lot No. 454A (untreated vaccine) was more than 20,000 per milliliter, whereas the count of lot No. 454C. (Roccal-treated) was 640 organisms per milliliter.

TABLE 4.—*Comparative titrations of Roccal-treated and untreated vaccine stored at room temperature*

Length and method of test	Dilution of vaccine	Percentage confluence		Length and method of test	Dilution of vaccine	Percentage confluence	
		Lot 454A untreated	Lot 454C treated			No. 454A untreated	No. 454C treated
(a) Freezer storage at −18° C. Mar. 24, 1944. Rabbit H526	1:1,000	100	100	(d) 15 days at room temperature.[1] May 24, 1944 Rabbit H570	1:1,000	95	95
	1:3,000	100	100		1:3,000	85	90
	1:10,000	100	100		1:10,000	50	50
	1:30,000	80	95		1:30,000	25	25
(b) 3 days at room temperature.[1] Apr. 7, 1944. Rabbit H595	1:1,000	100	100	(e) 22 days at room temperature.[1] Apr. 27, 1944. Rabbit H598	1:1,000	0	0
	1:3,000	95	95		1:3,000	0	0
	1:10,000	50	50		1:10,000	0	0
	1:30,000	20	30		1:30,000	0	0
(c) 9 days at room temperature.[1] Apr. 14, 1944. Rabbit H582	1:1,000	95	95				
	1:3,000	85	80				
	1:10,000	50	65				
	1:30,000	30	30				

[1] Room temperature ranged between 85° F. and 88° F. (29.4° C. to 31.1° C.).

The results presented in table 4 show that there was no significant difference in the animal titrations between Roccal-treated and untreated vaccine which could be attributed to an effect of the germicide on the virus. Tests were carried out on vacccine (a) fresh from freezer storage at −18° C., vaccine (b) after 3 days at room temperature,

vaccine (c) after 9 days at room temperature, vaccine (d) after 15 days at room temperature, and vaccine (e) after 22 days at room temperature. After 22 days at room temperature, both vaccines failed to exhibit any potency. It should be noted that the room temperature was high, ranging between 85° F. and 88° F. (29.4° C. to 31.1° C.) daily.

Further experiments have shown that vaccinia virus may withstand the presence of Roccal solution in a relatively high concentration (1:300) without being materially weakened. Vaccinial pulp was ground and suspended in a 1:300 solution of Roccal in the proportion of one part of pulp to two parts of Roccal 1:300 solution. This material was stored at 3° C. for 29 days and then tested for potency. The two dilutions used, 1:100 and 1:1,000, each resulted in 100-percent confluence of vesicles.

In view of the results obtained with 1:1,000 solution of Roccal, an effort was made to increase further the germicidal activity of the agent by increasing the concentration.

A consecutive series of calves were used in this experiment, They were treated in the usual manner except that, just prior to harvest of the vaccinial pulp, the operative field was sprayed with 1:100 solution of Roccal instead of the usual 1:1,000 solution. An exception was lot No. 487 which did not receive Roccal treatment. The results obtained are shown in table 5.

TABLE 5.—*Bacterial counts obtained with Roccal 1:100 solution*

Method of treatment of calves	Lot number	Time between preparation and 1st bacterial count (in days)	Bacterial count (number per milliliter)	Method of treatment of calves	Lot number	Time between preparation and 1st bacterial count (in days)	Bacterial count (number per milliliter)
Roccal 1:100	473	9	0	Roccal 1:100	483	7	16
Roccal 1:100	474	8	5	Roccal 1:100	484	2	72
Roccal 1:100	475	2	5	Roccal 1:100	485	21	12
Roccal 1:100	[1] 476	Same day	>20,000	Roccal 1:100	486	16	32
Roccal 1:100	477	15	5	Not treated with Roccal	[1] 487	15	>20,000
Roccal 1:100	478	12	8	Roccal 1:100	488	10	0
Roccal 1:100	479	7	18	Roccal 1:100	[1] 489	8	1,680
Roccal 1:100	480	1	0	Roccal 1:100	Average	8.8	15.5
Roccal 1:100	481	5	45				
Roccal 1:100	482	9	0				

[1] Lots No. 476, No. 487, No. 489 are not included in calculations of averages. Lots No. 476 and No. 489 were prepared by other operators, and lot No. 487 did not receive Roccal treatment.

An examination of the results presented in table 5 brings up an interesting point which should be stressed concerning the use of a germicide. The germicide reported on is not, and should not be used as, a substitute for cleanliness and care. In fact, in several instances in which an individual lacking in experience and with insufficient regard for asepsis has made vaccine, Roccal failed almost completely

to control the numbers of contaminating bacteria. This is illustrated by lots No. 476 and No. 489 in table 5. Only by the judicious application of good sanitation and good operating-room procedures, coupled with the use of an efficient germicide, will the operator succeed in producing calf-propagated vaccine of low bacterial content. Perhaps in the future a simple method of direct treatment of the vaccinial pump after harvest with a suitable agent will result in bacterial sterilization of the vaccine without injury to the virus. This line of treatment would be analogous to pasteurization of milk and would simplify greatly the establishment of standards governing the production of vaccine under many varying conditions of manufacture. Preliminary work indicates that there are chemical agents sufficiently selective in their action to be used in this manner.

In one experiment (*8*) the author has succeeded in rendering vaccinia virus free of viable bacteria, after harvest, by the use of 1:300 solution of Roccal. No conclusions can be drawn from this preliminary work. However, the indication is that direct treatment of the vaccinial pulp with Roccal or another suitable agent may offer a satisfactory method of controlling bacterial contamination of the product.

Test for presence of residual amounts of active germicide in vaccine from Roccal-treated calves.—The low bacterial counts obtained by spraying the calf with Roccal solution were very encouraging. However, it was necessary to determine if this was simply a result of some of the germicide being carried over into the vaccine and exerting there a bactericidal or bacteriostatic effect. If such were the case, the presence of germicide in the vaccine could easily be determined by adding definite quantities of a standardized suspension of bacteria to samples of both treated and untreated vaccine. Subsequent bacterial counts would then be expected to be lower in the vaccine samples containing the germicide.

The following experiment was conducted:

Four samples of vaccine, two of which had been treated with 1:100 solution of Roccal, one with 1:1,000 solution of Roccal, and one which had received no germicidal treatment, were all "ripened" in the 37° C. incubator until rendered bacteriologically sterile by the action of glycerine. Sterility was determined by plating on agar and by inoculation of thioglycollate fluid media. A standardized suspension of staphylococci was added to each sample of vaccine. Each milliliter of vaccine contained approximately 1,450 viable staphylococci. Two tests were made. The first was conducted on the samples immediately after the addition of the standardized bacterial suspension, and the second, 1 hour after the addition of the bacterial suspension. The latter samples were incubated 1 hour at 37° C. before plating.

TABLE 6.—*Test to determine presence of germicide in vaccine from Roccal-treated calves, approximately 1,450 staphylococci introduced in each milliliter of vaccine*

Method of treatment	A. Samples plated immediately after addition of bacterial suspension							
	Number of colonies on individual plates containing 1 ml. of 1:20 dilution of vaccine					Average number of colonies per plate	Average number of bacteria per milliliter	Percentage reduction in incubated samples
Lot No. 485, Roccal 1:100	77	64	73	79	89	76.4	1,528	----------
Lot No. 486, Roccal 1:1,000	66	83	74	67	80	74.0	1,480	----------
Lot No. 487, untreated	54	79	74	78	70	71.0	1,420	----------
Lot No. 488, Roccal 1:100	68	79	59	83	63	71.6	1,432	----------
	B. Samples incubated 1 hour at 37° C. after addition of bacterial suspension							
Lot No. 485, Roccal 1:100	48	41	30	60	49	45.6	912	40
Lot No. 486, Roccal 1:1,000	60	46	44	61	46	51.4	1,028	30
Lot No. 487, untreated	40	51	44	50	49	46.8	936	34
Lot No. 488, Roccal 1:100	36	37	43	66	48	46.0	920	35

One-milliliter amounts from each sample were diluted 1:20 with physiological saline. Nutrient agar pour plates were made, using five plates for each sample. Each plate received 1 ml. of the 1:20 dilution of vaccine. The results appear in table 6. The results as shown in table 6 clearly indicate that there is no appreciable amount of active germicide present in the Roccal-treated vaccines. There is close agreement in the results obtained with both the Roccal-treated and untreated vaccines. The reduction in viable bacteria obtained in the incubated samples is approximately equal in all four samples.

Test to determine if Roccal is inactivated by glycerinated vaccine at 37° C.—A final experiment was conducted to determine if Roccal is free to act in the presence of glycerinated vaccine, and to compare such action with its effect in the presence of physiological saline. The following procedure was employed:

Five samples of sterile vaccine and five samples of sterile physiological saline were prepared containing varying quantities of Roccal ranging in concentration from 1:100 to 1:1,000,000. One vaccine sample and one saline sample received no Roccal. All samples were incubated at 37° C. for 4 days. After 4 days, 1 ml. of a standardized suspension of staphylococci was added so that each milliliter of vaccine and saline samples then contained approximately 1,180 viable staphylococci. The vaccine and saline samples were incubated 1 hour at 37° C., and 1:20 dilutions in saline were made of each sample. Five plates were poured for each sample, each plate receiving 1 ml. of a 1:20 dilution (see fig. 7).

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The results obtained are summarized in tables 7 and 8 from which the following conclusions are drawn:

1) Roccal is effective against staphylococci in glycerinated vaccine containing up to 1:1,000 concentration of Roccal. It is only partially effective in 1:10,000 concentration and ineffective in concentrations less than 1:10,000.

TABLE 7.—*Effect of Roccal at 37° C. in presence of glycerinated vaccine (approximately 1,180 staphylococci introduced in each milliliter of vaccine samples)*

Concentration of Roccal in vaccine samples	Number of colonies on individual plates containing 1 ml. of 1:20 dilution of vaccine samples					Average number of colonies per plate	Average number of bacteria per milliliter
Roccal 1·100	0	0	0	0	0	0	0
Roccal 1·1,000	0	0	0	0	0	0	0
Roccal 1:10,000	31	48	38	33	39	37.8	756
Roccal 1:100,000	54	52	41	50	50	49.4	988
Roccal 1:1,000,000	34	48	52	55	49	47.6	952
No Roccal	42	42	55	56	56	50.2	1,004

TABLE 8.—*Effect of Roccal at 37° C. in presence of saline (approximately 1,180 staphylococci introduced in each milliliter of saline samples)*

Concentration of Roccal in vaccine samples	Number of colonies on individual plates containing 1 ml. of 1:20 dilution of vaccine samples					Average number of colonies per plate	Average number of bacteria per milliliter
Roccal 1·100	0	0	0	0	0	0	0
Roccal 1:1,000	0	0	0	0	0	0	0
Roccal 1.10,000	0	0	0	0	0	0	0
Roccal 1:100,000	0	0	2	1	0	0 6	12
Roccal 1:1,000,000	14	6	6	32	25	16.6	332.0
No Roccal	46	52	45	38	42	44.6	892.0

2) Roccal is effective in varying degree up to 1:1,000,000 concentration in saline. It is almost 100 times more active against staphylococci in saline than in glycerinated vaccine.

3) Roccal must exert its influence on the skin of the animal at the time of application rather than in vitro in the vaccine. This conclusion is borne out by the previous experiment in which a suspension of staphylococci was added to vaccine samples which had been treated with 1:100 solution of Roccal at the time of harvest. There was no influence on the number of organisms recovered that could be attributed to the action of residual amounts of Roccal in the vaccine.

4) The present experiment shows that Roccal in low concentration (1:10,000 and less) is practically ineffective in controlling the growth of staphylococci in the presence of glycerinated vaccine. The amount of Roccal which is carried over into the vaccine at the time of harvest is much less than that represented by a 1:10,000 concentration of Roccal.

SUMMARY OF PART II

A quaternary ammonium compound, Roccal, is compared with brilliant green as a germicide to be used in the production of smallpox vaccine. These germicides are applied to the skin surface of the operative field. Roccal was found to be a more efficient germicide with no demonstrable effect upon the virus.

The use of Roccal solution together with rigid sanitation during the quarantine and handling of animals make possible the production of vaccine containing extremely low numbers of viable organisms.

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ANNOUNCEMENT

DIRECTORY OF FULL-TIME LOCAL HEALTH OFFICERS, 1946

The 1946 revision of the Directory of Full-Time Local Health Officers is being issued as Supplement 194 to the Public Health Reports and will be available for distribution this month. In addition to listing the full-time local health officers of each State according to the local health jurisdictions which they serve, the tabulation includes the classification of each jurisdiction, the incorporated places of 10,000 or more covered by the county organizations described, and the post office address and title of each health officer.

INCIDENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES

February 23–March 22, 1947

The accompanying table summarizes the incidence of nine important communicable diseases, based on weekly telegraphic reports from State health departments. The reports from each State for each week are

published in PUBLIC HEALTH REPORTS under the section "Incidence of Disease." The table gives the number of cases of these diseases for the 4 weeks ended March 22, 1947, the number reported for the corresponding period in 1946, and the median number for the years 1942–46.

DISEASES ABOVE MEDIAN INCIDENCE

Influenza—The number of reported cases of influenza rose from 15,907 during the 4 weeks ended February 22 to 125,077 during the 4 weeks ended March 22. The number of cases was more than seven times the normal median expectancy. Of the total cases Texas reported 53,874, Arkansas 13,493, Kansas 11,927, Oklahoma 9,041, Colorado 5,457, West Virginia 5,044, South Carolina 4,464, Virginia 3,601, and Iowa 3,496. More than 85 percent of the total reported cases occurred in those 9 States.[1] The current rise of this disease has appeared in States in all sections of the country except the North Atlantic sections. However, the rise on the West Coast has not yet reached as large proportions as in other sections.

During the 4 weeks of the current period the cases rose from about 8,000 to 52,000 per week. Figures available for the next week (ended March 29) indicate 49,000 cases or slightly less than the preceding week.

The epidemic-like wave of influenza appeared rather late this season. The peak incidence in preceding years has usually been reached during February, with the number of cases dropping rapidly during March. In January and February of 1947 the incidence was below the median expectancy, but during the current period (mostly in March) it was the highest in the 19 years for which data are available in this form. While it appears that there are localized epidemics of respiratory infection of varying degrees of severity, most reports indicate a mild type. It is realized that reporting of influenza is extremely erratic but these extensive reports can leave no doubt that an epidemic is in progress.

While there are no data available on deaths from influenza and pneumonia, it may be assumed that at least part of the increased death rate from all causes which was reported for 93 large cities during the month of March was due to these causes. The reports released by the National Office of Vital Statistics showed an excess of 6 percent over the median for the same period in the three preceding years.

Diphtheria.—While the number of cases (1,068) of diphtheria reported for the current 4 weeks was only about 75 percent of the 1946 figure for these same weeks, it was very slightly above the 1942–46

[1] Special surveys show widespread prevalence of upper respiratory infections in Kentucky, but since the reports indicated an accumulation of cases they were not included in the total for the 4 weeks ended March 22.

median. For the second consecutive 4-week period since the week ended August 10, 1946 the current incidence was higher than the preceding 5-year median for a corresponding 4-week period. The very small excesses were largely due to the incidence in the New England section, the reported cases (85) being 3 times the median. Excesses of 3, 4, 13, and 14 cases were reported from 4 other sections. In the other 4 of the 9 sections the incidence was the same as or less than the 5-year median for this period.

Poliomyelitis.—The number of cases of poliomyelitis dropped from 185 during the preceding 4 weeks to 156 for the week ended March 22. The number reported was slightly above the incidence for the corresponding period in 1946 and 1.7 times the 1942–46 median. Each section except the Middle Atlantic reported some increase over the median expectancy, but in the Pacific section the number of cases (49) was 2.7 times the 1942–46 median. For the past 3 years this disease has been unusually prevalent, and it is significant that for the 3 consecutive 4-week periods of 1947 the incidence has been the highest for these periods in the 19 years for which data are available in this form.

Whooping cough.—The incidence of whooping cough (10,709 cases) was about 45 percent above that for the corresponding 4 weeks in 1946, but it was only slightly above the 1942–46 median. In the West South Central section the number of cases (2,006) was 2.4 times the median and in the East North Central section the incidence was 1.6 times the normal seasonal median. In all other sections the incidence was relatively low.

DISEASES BELOW MEDIAN INCIDENCE

Measles.—For the 4 weeks ended March 22 there were 27,030 cases of measles reported, as compared with 117,342 for the corresponding 4-week period in 1946, and a 5-year (1942–46) median of 87,789 cases. The current incidence was below the normal seasonal expectancy in all sections except the New England where the number of cases was about 10 percent above the preceding 5-year median. With the exception of 1945 when approximately 14,000 cases were recorded during these same weeks, the current incidence is the lowest in the 19 years for which these data are available.

Meningococcus meningitis.—The number of cases (372) of meningococcus meningitis reported for the current 4 weeks was about one-half of the number reported for the corresponding period in 1946, and less than 40 percent of the 1942–46 median (1,018 cases). Each section of the country reported a relatively low incidence and for the country as a whole the current incidence was the lowest during this period

since 1942 when 339 cases were reported. While the number of cases of this disease has been gradually declining after a period of unusually high incidence, the number of cases being reported is still considerably above the median of nonepidemic years (approximately 260 cases).

Scarlet fever.—The scarlet fever incidence continued at a relatively low level, the number of cases reported (12,272) being about 75 percent of the incidence during the corresponding period in 1946 and less than 70 percent of the 1942–46 median. The number of cases reported from each section of the country was below the preceding 5-year median. For the country as a whole the current incidence was the lowest in the 19 years for which data are available in this form.

Smallpox.—For the 4 weeks ended March 22 there were 19 cases of smallpox reported. For the corresponding weeks in 1946 there were 41 cases and the 1942–46 median was represented by that figure. The current incidence was the lowest on record for this period, the incidence (19 cases) comparing with such figures as 6,502 for the corresponding weeks in 1930 and 2,056 in 1938, the 2 years reporting the highest numbers of cases in the 19 years for which these data are available. Since 1939 this disease has declined rapidly; prior to 1935 it had been on the decline, but for a period of 5 years (1935–39) minor epidemics appeared in various sections of the country.

Typhoid and paratyphoid fever.—For the 4 weeks ended March 22 there were 189 cases of typhoid fever reported. The 1942–46 median for these same weeks was 229 cases. Increases over the median expectancy were reported from the New England and Pacific sections. In all other parts of the country the numbers of cases were the same as the medians or fell considerably below them. For these diseases also the current incidence was the lowest in the 19 years for which data are available in this form.

MORTALITY, ALL CAUSES

For the 4 weeks ended March 22 there were 40,907 deaths from all causes reported to the National Office of Vital Statistics by 93 large cities. The median number reported for the same weeks in 1944–46 was 38,586. For each week of the current period the number of deaths exceeded the 1942–46 median and for the entire period the number of deaths was 6 percent above the preceding 3-year median for the corresponding 4 weeks. While the cases occurring in the epidemic-like rise of respiratory diseases which has been in progress during the month of March appeared to be of a mild type, presumably part of the increase in the number of deaths was due to mortality from influenza and pneumonia.

Number of reported cases of 9 communicable diseases in the United States during the 4-week period Feb. 23–Mar. 22, 1947, the number for the corresponding period in 1946, and the median number of cases reported for the corresponding period, 1942–46

Division	Current period	1946	5-year median	Current period	1946	5-year median	Current period	1946	5-year median
	Diphtheria			Influenza [1]			Measles [2]		
United States	1,068	1,399	1,062	125,077	18,400	17,615	27,030	117,342	87,789
New England	85	44	29	52	94	83	6,787	3,099	6,153
Middle Atlantic	131	148	140	90	71	95	4,608	35,849	21,783
East North Central	145	328	142	2,620	710	533	4,568	29,382	13,993
West North Central	111	111	111	17,063	134	183	639	7,371	7,699
South Atlantic	138	200	156	15,939	4,299	4,540	4,492	9,193	9,193
East South Central	121	128	108	3,933	1,391	1,391	1,195	4,305	3,863
West South Central	164	260	230	76,571	9,939	6,921	2,161	7,343	7,343
Mountain	55	50	51	7,751	1,144	1,144	1,398	4,969	4,969
Pacific	118	130	104	1,058	618	553	1,182	15,831	9,085
	Meningococcus meningitis			Poliomyelitis			Scarlet fever		
United States	372	756	1,018	156	141	92	12,272	16,020	18,079
New England	11	37	50	6	9	5	879	1,364	2,361
Middle Atlantic	70	147	239	12	15	12	3,112	4,844	5,269
East North Central	52	148	188	18	13	9	4,085	4,413	5,420
West North Central	42	55	70	16	2	7	1,082	1,386	2,005
South Atlantic	44	121	158	14	34	10	818	1,522	1,522
East South Central	39	72	93	12	8	8	553	455	722
West South Central	64	86	101	22	18	16	313	465	465
Mountain	8	12	13	7	10	6	498	517	848
Pacific	42	78	111	49	32	18	932	1,054	1,054
	Smallpox			Typhoid and paratyphoid fever			Whooping cough [2]		
United States	19	41	41	189	198	229	10,709	7,406	10,667
New England	0	0	0	15	19	8	1,002	1,168	1,445
Middle Atlantic	0	0	0	20	25	43	1,984	1,778	2,137
East North Central	5	6	13	29	24	29	2,451	1,467	1,569
West North Central	8	5	10	10	7	10	345	252	433
South Atlantic	1	2	2	30	38	54	1,384	863	1,570
East South Central	1	5	5	15	16	17	427	220	485
West South Central	2	11	13	30	39	39	2,000	747	838
Mountain	2	0	3	8	12	9	237	353	437
Pacific	0	12	2	32	18	20	873	558	1,434

[1] Mississippi and New York excluded; New York City included.
[2] Mississippi excluded.

DEATHS DURING WEEK ENDED MAR. 22, 1947

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Mar. 22, 1947	Corresponding week, 1946
Data for 93 large cities of the United States:		
Total deaths	10,225	9,569
Median for 3 prior years	9,605	
Total deaths, first 12 weeks of year	120,684	123,115
Deaths under 1 year of age	721	573
Median for 3 prior years	603	
Deaths under 1 year of age, first 12 weeks of year	9,731	7,244
Data from industrial insurance companies:		
Policies in force	67,330,226	67,186,575
Number of death claims	12,969	14,344
Death claims per 1,000 policies in force, annual rate	10.0	11.1
Death claims per 1,000 policies, first 12 weeks of year, annual rate	9.8	11.4

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED MAR. 29, 1947

Summary

A slight net decrease was reported in the incidence of influenza. The total reported for the week was 48,968 cases, as compared with 52,115 last week and a 5-year (1942–46) median of 2,770. Decreases were recorded in only 2 of the 9 geographic divisions—the East and West South Central areas, where an increase in Tennessee was more than offset by a decline in Alabama, and sharp declines were reported in Arkansas, Oklahoma, and Texas. Net increases of 1,251, 2,265, and 2,767 cases, respectively, occurred in the East and West North Central and South Atlantic areas. Of 22 States reporting currently 220 or more cases each and an aggregate of 47,896 (last week 50,937), 11 showed a decrease of 12,679. The 14 States reporting currently 428 or more cases each are as follows (last week's figures in parentheses): *Increases*—Wisconsin 1,853 (537), Iowa 6,036 (2,321), Virginia 3,986 (1,439), South Carolina 2,305 (1,814), Tennessee 1,125 (550), Montana 851 (565), Washington 428 (353); *decreases*—Kansas 926 (1,947), West Virginia 2,474 (2,589), Georgia 805 (1,019), Alabama 1,085 (1,847), Arkansas 4,576 (6,859), Alabama 6,891 (7,624), Texas 12,332 (19,087). During the 5 weeks ended March 29, 174,045 cases were reported or 84 percent of the total for the year to date (206,662, last year 175,984). In the years 1946, 1945, and 1944 the percentages in the respective corresponding 5-week periods were 12, 31, and 6 percent. The total to date since the average seasonal low week (last week of July) is 239,637, as compared with 538,232 for the corresponding period of 1945–46.

Of 81 cases of amebic dysentry reported currently, 36 occurred in Louisiana and 10 each in New York and Texas; of 12 cases of smallpox, 9 occurred in Texas (only 1 case previously this year), 2 in Tennessee, and 1 in Iowa; and of 167 cases of undulant fever (last week 93), 54 occurred in Colorado, 19 in Iowa, and 16 in Texas.

Deaths recorded for the week in 93 large cities of the United States totaled 10,820, as compared with 10,186 last week, 9,461 and 9,140, respectively, for the corresponding weeks of 1946 and 1945, and a 3-year (1944–46) median of 9,461. The total for the year to date in these cities is 131,459, as compared with 132,576 for the corresponding period last year.

Telegraphic morbidity reports from State health officers for the week ended Mar. 29, 1947, and comparison with corresponding week of 1946 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria: Week ended— Mar. 29, 1947	Diphtheria: Week ended— Mar. 30, 1946	Diphtheria: Median 1942–46	Influenza: Week ended— Mar. 29, 1947	Influenza: Week ended— Mar. 30, 1946	Influenza: Median 1942–46	Measles: Week ended— Mar. 29, 1947	Measles: Week ended— Mar. 30, 1946	Measles: Median 1942–46	Meningitis, meningococcus: Week ended— Mar. 29, 1947	Meningitis, meningococcus: Week ended— Mar. 30, 1946	Meningitis, meningococcus: Median 1942–46
NEW ENGLAND												
Maine	1	2	0	------	------	------	195	27	27	0	0	3
New Hampshire	0	0	0	1	3	3	5	13	8	0	0	0
Vermont	0	1	0	107	------	------	275	5	70	0	0	0
Massachusetts	10	4	4	------	------	------	404	1,149	1,149	0	1	9
Rhode Island	0	1	1	------	1	1	165	5	11	0	3	3
Connecticut	2	2	1	------	5	3	573	163	365	0	2	5
MIDDLE ATLANTIC												
New York	20	27	17	[1] 9	[1] 2	[1] 6	383	5,011	2,799	4	24	30
New Jersey	1	4	3	23	4	7	390	2,971	1,653	1	5	5
Pennsylvania	22	24	12	------	2	2	291	3,790	1,424	9	7	11
EAST NORTH CENTRAL												
Ohio	13	21	10	141	4	9	647	635	635	7	12	12
Indiana	10	6	6	259	8	15	90	1,045	294	1	1	2
Illinois	6	25	15	189	8	14	77	1,620	1,271	10	17	17
Michigan [2]	7	7	7	78	2	2	41	2,410	1,295	4	2	7
Wisconsin	8	0	1	1,853	22	46	289	2,548	1,563	1	2	2
WEST NORTH CENTRAL												
Minnesota	2	5	3	13	------	------	73	32	126	1	5	4
Iowa	0	4	2	6,036	------	------	107	118	165	1	0	2
Missouri	1	5	4	230	1	2	4	434	369	3	5	6
North Dakota	0	1	0	20	10	3	16	16	56	0	1	0
South Dakota	0	5	3	------	------	------	13	19	19	0	0	0
Nebraska	2	3	3	9	------	9	4	194	190	0	1	0
Kansas	5	2	2	926	1	3	11	1,077	646	3	1	2
SOUTH ATLANTIC												
Delaware	0	1	0	------	------	------	2	26	22	0	0	1
Maryland [2]	6	18	11	20	7	7	23	582	582	1	2	5
District of Columbia	0	0	0	4	------	1	31	350	91	0	1	2
Virginia	9	4	4	3,986	180	259	437	628	621	2	4	5
West Virginia	3	1	2	2,474	3	7	95	130	130	1	3	4
North Carolina	7	9	8	------	------	26	265	470	470	3	3	3
South Carolina	7	5	5	2,305	482	473	127	584	347	1	1	2
Georgia	3	4	4	805	7	35	87	267	264	1	2	4
Florida	5	4	3	135	3	3	21	231	231	0	3	2
EAST SOUTH CENTRAL												
Kentucky	10	7	5	------	69	9	4	342	111	4	2	5
Tennessee	4	7	4	1,125	22	44	80	297	297	3	3	7
Alabama	12	8	7	1,085	93	93	145	164	257	4	6	6
Mississippi [2]	6	5	5	255	------	------	19	------	------	1	3	3
WEST SOUTH CENTRAL												
Arkansas	5	10	4	4,576	98	87	117	222	222	0	3	2
Louisiana	1	5	3	315	109	8	119	310	240	1	5	5
Oklahoma	3	5	4	6,891	73	131	8	213	107	2	0	1
Texas	28	19	33	12,332	1,105	1,129	289	1,923	1,923	2	4	16
MOUNTAIN												
Montana	1	3	0	851	2	13	137	45	150	1	1	1
Idaho	1	2	1	242	25	------	4	103	29	0	0	0
Wyoming	0	3	1	53	------	12	15	27	77	0	0	0
Colorado	4	9	7	393	35	35	40	639	354	0	0	2
New Mexico	3	0	0	22	4	3	88	21	21	0	1	1
Arizona	3	5	2	119	111	98	------	136	136	1	0	0
Utah [2]	0	0	0	309	13	13	15	658	235	0	0	0
Nevada	0	0	0	------	------	------	------	2	2	0	0	0
PACIFIC												
Washington	10	7	7	428	------	1	52	625	286	0	2	3
Oregon	1	8	5	220	2	22	31	352	135	2	2	2
California	8	29	21	129	55	70	261	3,047	2,705	3	9	23
Total	250	327	242	48,968	2,571	2,770	6,565	35,676	26,183	78	149	216
13 weeks	3,760	4,938	4,020	206,662	175,984	61,452	69,066	222,217	210,408	1,117	2,548	3,232
Seasonal low week [3]	(27th) July 5–11			(30th) July 28–Aug. 1			(35th) Aug. 30–Sept. 5			(37th) Sept. 13–19		
Total since low	11,326	16,582	12,751	239,637	538,232	97,314	91,953	248,341	248,341	2,089	4,052	5,684

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Dates between which the approximate low week ends. The specific date will vary from year to year.

Telegraphic morbidity reports from State health officers for the week ended Mar. 29, 1947, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Poliomyelitis: Week ended— Mar. 29, 1947	Poliomyelitis: Week ended— Mar. 30, 1946	Poliomyelitis: Median 1942–46	Scarlet fever: Week ended Mar. 29, 1947	Scarlet fever: Week ended Mar. 30, 1946	Scarlet fever: Median 1942–46	Smallpox: Week ended— Mar. 29, 1947	Smallpox: Week ended— Mar. 30, 1946	Smallpox: Median 1942–46	Typhoid and paratyphoid fever: Week ended— Mar. 29, 1947[4]	Typhoid and paratyphoid fever: Week ended— Mar. 30, 1946	Typhoid and paratyphoid fever: Median 1942–46
NEW ENGLAND												
Maine	0	0	0	25	32	32	0	0	0	0	0	0
New Hampshire	0	0	0	3	6	14	0	0	0	0	0	0
Vermont	0	0	0	8	11	11	0	0	0	0	1	0
Massachusetts	0	0	0	146	222	431	0	0	0	7	0	0
Rhode Island	0	0	0	10	7	17	0	0	0	0	0	0
Connecticut	0	1	0	63	70	70	0	0	0	0	1	0
MIDDLE ATLANTIC												
New York	3	3	2	406	895	749	0	0	0	1	2	3
New Jersey	0	0	0	150	167	167	0	0	0	0	0	1
Pennsylvania	0	0	0	256	472	494	0	0	0	4	1	1
EAST NORTH CENTRAL												
Ohio	0	1	1	398	409	414	0	3	0	0	3	2
Indiana	0	0	0	85	97	125	0	0	0	1	1	0
Illinois	0	0	0	132	246	271	0	0	1	0	4	3
Michigan[2]	2	0	0	205	111	219	0	0	0	1	3	2
Wisconsin	0	0	0	57	152	317	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	1	0	0	40	49	89	0	0	0	2	0	0
Iowa	0	0	0	34	60	60	1	1	1	1	0	0
Missouri	0	0	0	42	55	80	0	0	0	3	1	1
North Dakota	1	0	0	24	16	21	0	0	0	2	3	0
South Dakota	0	0	0	8	8	11	0	0	0	0	0	0
Nebraska	2	0	0	16	41	43	0	0	0	0	0	0
Kansas	0	0	0	52	71	81	0	0	0	0	1	0
SOUTH ATLANTIC												
Delaware	0	0	0	14	9	11	0	0	0	0	0	0
Maryland[2]	0	0	0	37	85	146	0	0	0	2	0	0
District of Columbia	0	0	0	14	25	25	0	0	0	0	0	0
Virginia	0	1	0	41	104	104	0	0	0	1	1	1
West Virginia	0	0	0	19	50	39	0	0	0	3	0	1
North Carolina	0	2	0	36	39	32	0	0	0	0	1	0
South Carolina	0	0	0	19	18	5	0	0	0	1	0	1
Georgia	0	0	0	12	12	15	0	0	0	1	2	2
Florida	0	3	0	10	9	8	0	0	0	1	0	1
EAST SOUTH CENTRAL												
Kentucky	0	0	1	70	31	68	0	0	0	2	1	1
Tennessee	0	0	0	51	35	45	2	0	0	0	2	2
Alabama	2	1	0	26	44	16	0	1	0	2	5	2
Mississippi[2]	1	0	0	9	6	9	0	0	1	0	0	1
WEST SOUTH CENTRAL												
Arkansas	0	2	1	9	11	10	0	0	1	1	2	1
Louisiana	1	0	0	6	13	13	0	1	0	1	2	2
Oklahoma	0	0	0	14	8	15	0	0	1	1	0	1
Texas	2	2	2	36	53	118	9	0	1	4	13	7
MOUNTAIN												
Montana	0	0	0	7	6	16	0	0	0	0	0	0
Idaho	0	0	0	4	8	8	0	0	0	0	0	0
Wyoming	0	0	0	6	5	12	0	0	0	0	0	0
Colorado	0	1	1	50	27	39	0	0	0	0	0	0
New Mexico	0	4	0	21	7	7	0	0	0	0	2	1
Arizona	0	0	0	8	13	19	0	0	0	0	1	0
Utah[2]	0	0	0	19	25	49	0	0	0	0	0	0
Nevada	0	0	0	0	0	1	0	0	0	0	0	0
PACIFIC												
Washington	0	0	0	22	41	41	0	19	1	2	0	0
Oregon	0	0	0	20	29	29	0	0	0	1	0	0
California	9	4	3	152	229	229	0	0	0	4	2	3
Total	24	25	20	2,892	4,139	4,336	12	25	25	49	55	55
13 weeks	680	518	340	35,869	44,541	52,173	61	124	162	570	573	719
Seasonal low week[3]	(11th) Mar. 15–21			(32nd) Aug. 9–15			(35th) Aug. 30–Sept. 5			(11th) Mar. 15–21		
Total since low	55	52	38	62,555	83,112	91,269	115	200	279	85	98	107

[2] Period ended earlier than Saturday.
[3] Dates between which the approximate low week ends. The specific date will vary from year to year.
[4] Including paratyphoid fever reported separately, as follows: Massachusetts 7 (salmonella infection); New York 1; Michigan 1; Georgia 1; Kentucky 1; Louisiana 1; Texas 1; Washington 2; California 2.

Telegraphic morbidity reports from State health officers for the week ended Mar. 29, 1947, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Whooping cough			Week ended Mar. 29, 1947							
	Week ended—		Median 1942–46	Dysentery			Encephalitis, infectious	Rocky Mt. spotted fever	Tularemia	Typhus fever, endemic	Undulant fever
	Mar. 29, 1947	Mar. 30, 1946		Amebic	Bacillary	Unspecified					
NEW ENGLAND											
Maine	10	12	19								1
New Hampshire	5	2	11								
Vermont	11	50	37								
Massachusetts	130	150	179	1	2						
Rhode Island	4	21	21				1				
Connecticut	42	60	51								8
MIDDLE ATLANTIC											
New York	160	200	231	10			1			1	6
New Jersey	110	141	141	2							
Pennsylvania	197	117	122								1
EAST NORTH CENTRAL											
Ohio	121	70	157	1							4
Indiana	15	26	26				3		1		4
Illinois	56	78	78	1			1				8
Michigan [2]	212	101	121								1
Wisconsin	107	81	81								10
WEST NORTH CENTRAL											
Minnesota	8	7	23	3							2
Iowa	9	8	11	1							19
Missouri	15	4	8								
North Dakota			1								
South Dakota											
Nebraska	15		7			2					
Kansas	16	25	47				1				8
SOUTH ATLANTIC											
Delaware	3	1	6								
Maryland [2]	46	20	39	1							1
District of Columbia	6	5	5								
Virginia	81	14	53			116					2
West Virginia		15	16								
North Carolina	75	98	112							1	
South Carolina	45	67	72	1	6						
Georgia	2	22	28	1		2			1	3	1
Florida	25	22	22	1		1					
EAST SOUTH CENTRAL											
Kentucky	51	24	28								
Tennessee	72	18	18								1
Alabama	66	18	31	2						5	1
Mississippi [2]	8										2
WEST SOUTH CENTRAL											
Arkansas	33	4	13								1
Louisiana	3	2	5	36					1	1	
Oklahoma	30	4	9	4					1		3
Texas	568	132	260	10	201	25			1	7	16
MOUNTAIN											
Montana	8	1	10								
Idaho		7	5				1				4
Wyoming		1	3								
Colorado	13	22	22								54
New Mexico	23	7	10				1				
Arizona	16	15	29	1		24					1
Utah [2]	3	24	32								
Nevada											
PACIFIC											
Washington	38	31	31								
Oregon	17	7	28	1							1
California	164	83	283	4	4		2				7
Total	2,639	1,817	2,551	81	213	170	11	0	5	18	167
Same week, 1946	1,817			24	208	74	9	1	16	33	95
Median, 1942–46	2,551			38	208	71	7	1	16	33	[5] 90
13 weeks: 1947	33,138			627	4,267	2,849	92	12	473	561	1,372
1946	23,619			483	3,667	1,386	106	6	267	609	972
Median, 1942–46	31,641			370	2,602	856	106	4	246	609	[5] 1,036

[2] Period ended earlier than Saturday.
[5] 2-year average, 1945–46.

Anthrax: New York 1 case; Pennsylvania 1 case.
Leprosy: Louisiana 1 case; Texas 3 cases.

WEEKLY REPORTS FROM CITIES [1]

City reports for week ended Mar. 22, 1947

This table lists the reports from 85 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	1	0	------	0	54	0	0	0	2	0	0	6
New Hampshire:												
Concord	0	0	------	0	------	0	0	0	0	0	0	------
Vermont:												
Barre	0	0	------	0	11	0	0	0	0	0	0	3
Massachusetts:												
Boston	11	0	------	1	39	0	13	0	25	0	0	26
Fall River	0	0	------	1	5	0	1	0	2	0	0	2
Springfield	3	0	------	0	7	0	0	0	7	0	0	------
Worcester	0	0	------	0	6	0	5	0	4	0	0	27
Rhode Island:												
Providence	1	0	------	0	143	0	2	0	4	0	0	13
Connecticut:												
Bridgeport	0	0	------	0	15	0	0	0	3	0	0	------
Hartford	0	0	------	0	30	0	1	0	2	0	0	3
New Haven	0	0	------	0	41	0	1	0	5	0	0	8
MIDDLE ATLANTIC												
New York:												
Buffalo	1	0	------	0	------	0	6	0	4	0	0	------
New York	18	0	10	0	180	4	79	0	181	0	2	40
Rochester	0	0	------	0	1	1	4	0	19	0	0	4
Syracuse	0	0	------	0	------	0	2	0	10	0	0	11
New Jersey:												
Camden	7	0	------	0	1	0	0	0	2	0	0	------
Newark	0	0	1	0	13	1	6	0	10	0	0	29
Trenton	0	0	12	0	29	0	2	0	2	0	0	2
Pennsylvania:												
Philadelphia	5	0	3	1	12	3	23	0	56	0	0	47
Pittsburgh	1	0	6	2	38	2	11	0	19	0	0	15
Reading	0	0	------	0	2	0	3	0	0	0	0	------
EAST NORTH CENTRAL												
Ohio:												
Cleveland	0	0	56	0	305	2	12	0	48	0	1	20
Columbus	0	0	3	3	14	0	2	0	19	0	0	10
Indiana:												
Fort Wayne	0	0	------	1	13	0	3	0	1	0	0	------
Indianapolis	1	1	------	8	4	0	11	0	27	0	0	28
South Bend	0	0	------	0	9	0	0	0	1	0	0	------
Terre Haute	0	0	------	0	------	0	6	0	0	0	0	1
Illinois:												
Chicago	1	0	32	1	13	6	48	0	50	0	1	33
Michigan:												
Detroit	4	1	23	0	10	0	11	0	69	0	0	92
Flint	0	0	------	0	1	0	3	0	13	0	0	3
Grand Rapids	0	0	2	0	1	0	3	0	10	0	0	6
Wisconsin:												
Kenosha	0	0	------	0	1	0	0	0	0	0	0	6
Milwaukee	0	0	1	1	------	0	5	0	17	0	2	34
Racine	0	0	1	1	------	0	0	0	5	0	0	3
Superior	0	0	8	0	------	0	0	0	1	0	0	------
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0	------	2	------	0	0	0	4	0	0	1
Minneapolis	3	0	------	0	5	3	4	0	12	0	0	4
Missouri:												
Kansas City	1	0	25	1	1	0	18	0	17	0	0	2
St. Joseph	0	0	------	0	------	1	0	1	0	0	0	2
St. Louis	2	0	56	2	7	3	35	0	7	0	0	8

[1] In some instances the figures include nonresident cases.

City reports for week ended Mar. 22, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
Nebraska:												
Omaha	0	0	------	3	1	0	5	2	4	0	0	------
Kansas:												
Wichita	0	0	------	0	2	1	6	0	1	0	0	------
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0	------	0	------	0	1	0	4	0	0	1
Maryland:												
Baltimore	6	0	13	0	1	1	13	0	26	0	0	53
Cumberland	0	0	------	0	2	0	2	0	0	0	0	------
Frederick	0	0	------	0	------	0	0	0	0	0	0	------
District of Columbia:												
Washington	0	0	5	0	27	1	8	0	6	0	0	4
Virginia:												
Lynchburg	0	0	------	0	1	0	1	0	4	0	0	------
Richmond	1	0	1	1	80	0	2	0	0	0	0	2
Roanoke	0	0	------	0	4	0	0	0	6	0	0	------
West Virginia:												
Charleston	0	0	------	0	------	0	0	0	0	0	0	------
Wheeling	0	0	141	0	------	0	1	0	0	0	0	1
North Carolina:												
Raleigh	0	0	------	0	6	0	2	0	0	0	0	6
Wilmington	1	0	------	0	5	0	2	0	1	0	0	------
Winston Salem	0	0	------	0	9	0	4	0	0	0	0	1
South Carolina:												
Charleston	0	0	37	0	13	0	1	0	0	0	0	------
Georgia:												
Atlanta	0	0	143	1	12	0	4	0	5	0	0	------
Brunswick	0	0	------	0	------	0	1	0	0	0	0	------
Savannah	0	0	21	0	29	0	0	0	0	0	0	------
Florida:												
Tampa	1	0	5	2	1	0	0	0	2	0	0	1
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	0	1	1	1	4	0	7	0	6	0	0	4
Nashville	1	0	------	1	------	0	5	0	15	0	0	6
Alabama:												
Birmingham	0	0	66	0	27	0	9	0	2	0	0	------
Mobile	0	0	4	2	15	1	2	0	0	0	0	10
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	2	0	375	0	4	0	0	0	0	0	0	2
Louisiana:												
New Orleans	1	0	30	3	52	0	8	1	0	0	1	1
Shreveport	0	0	------	0	------	0	9	0	0	0	0	------
Oklahoma:												
Oklahoma City	0	1	1,296	0	------		6	0	2	0	0	------
Texas:												
Dallas	0	0	------	1	20	0	2	0	0	0	0	20
Galveston	1	0	------	0	------	0	0	0	0	0	0	------
Houston	0	0	4	0	------	0	8	0	1	0	0	------
San Antonio	2	0	14	10	7	0	10	0	2	0	0	------
MOUNTAIN												
Montana:												
Billings	0	0	------	0	1	0	1	0	0	0	0	------
Great Falls	0	0	------	1	95	0	1	0	0	0	0	------
Helena	0	0	------	0	------	0	0	0	0	0	0	------
Missoula	0	0	------	0	3	0	0	0	0	0	0	------
Colorado:												
Denver	0	0	10	2	26	0	5	0	20	0	0	5
Pueblo	0	0	------	0	------	0	2	0	4	0	0	------
Utah:												
Salt Lake City	0	0	------	0	3	0	2	0	1	0	0	1

City reports for week ended Mar. 22, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle	1	0	------	0	3	0	5	0	6	0	1	1
Spokane	0	0	4	0	13	0	1	0	3	0	1	1
Tacoma	0	0	------	0	1	0	0	0	2	0	0	2
California:												
Los Angeles	7	0	3	1	8	1	3	8	31	0	0	27
Sacramento	1	0	------	0	------	0	4	0	1	0	0	------
San Francisco	1	0	2	0	6	0	2	0	20	0	0	------
Total	86	4	2,414	54	1,492	36	465	12	833	0	9	638
Corresponding week, 1946*	61	------	49	20	12,508	------	357	------	1,199	3	13	480
Average 1942-46*	66	------	129	[2] 30	[3] 6,589	------	[2] 407	------	1,707	1	12	692

[2] 3-year average, 1944-46.
[3] 5-year median, 1942-46.
*Exclusive of Oklahoma City.

Dysentery, amebic.—Cases: Boston 1; New York 11; Los Angeles 3.
Dysentery, bacillary.—Cases: Worcester 1; Los Angeles 2.
Dysentery, unspecified.—Cases: San Antonio, 4.
Tularemia.—Cases: Terre Haute 1; St. Louis 1.
Typhus fever, endemic.—Cases: Chicago 1; Savannah 1; Tampa 1; Birmingham 1; New Orleans 2; Shreveport 1.

Rates (annual basis) per 100,000 population, by geographic groups, for the 85 cities in the preceding table (latest available estimated population, 33,693,900)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England	41.8	0.0	0.0	5.2	917	0.0	60.1	0.0	141	0.0	0.0	230
Middle Atlantic	14.8	0.0	14.8	1.4	128	5.1	62.9	0.0	140	0.0	0.9	69
East North Central	3.9	1.3	81.8	9.7	241	5.2	67.5	0.0	169	0.0	2.6	153
West North Central	13.9	0.0	187.6	18.5	37	30.1	157.5	6.9	104	0.0	0.0	39
South Atlantic	14.7	0.0	598.2	6.5	311	3.3	68.6	0.0	88	0.0	0.0	113
East South Central	5.9	5.9	419.0	23.6	271	5.9	135.7	0.0	136	0.0	0.0	118
West South Central	15.2	2.5	4,366.5	35.6	211	0.0	109.2	2.5	13	0.0	2.5	58
Mountain	0.0	0.0	82.6	24.8	1,057	0.0	90.9	0.0	206	0.0	0.0	50
Pacific	15.8	0.0	14.2	1.6	49	1.6	23.7	12.7	100	0.0	3.2	49
Total	13.3	0.6	374.7	8.4	232	5.6	72.2	1.9	129	0.0	1.4	99

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended March 8, 1947.—During the week ended March 8, 1947, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		32	1	305	442	20	30	85	115	1,030
Diphtheria			1	16	7	2	1		3	30
Dysentery:										
Amebic					6	6				12
Bacillary				3						3
German measles				6	51	1	1	10	5	74
Influenza		94			42				90	226
Measles		147	2	167	109	264	119	201	534	1,543
Meningitis, meningococcus				1	1	1		1	1	5
Mumps		8		51	786	76	201	29	196	1,347
Poliomyelitis		1					1			2
Scarlet fever		6	1	87	90	4	5	1	10	204
Tuberculosis (all forms)		1	22	102	28	25	16	31	55	280
Typhoid and paratyphoid fever				8	2			1		11
Undulant fever				6			1		2	9
Venereal diseases:										
Gonorrhea		16	7	104	94	42	23	53	70	409
Syphilis	1	5	5	91	109	11	6	7	47	282
Other forms									2	2
Whooping cough			4	35	93	31	1	3	32	199

FINLAND

Notifiable diseases—January 1947.—During the month of January 1947, cases of certain notifiable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	20	Poliomyelitis	4
Diphtheria	1,016	Scarlet fever	263
Dysentery	6	Syphilis	552
Gonorrhea	1,429	Typhoid fever	37
Paratyphoid fever	161		

NORWAY

Notifiable diseases—December 1946.—During the month of December 1946, cases of certain notifiable diseases were reported in Norway as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	6	Mumps	322
Diphtheria	285	Paratyphoid fever	12
Dysentery, unspecified	4	Pneumonia (all forms)	2,273
Encephalitis, epidemic	3	Poliomyelitis	29
Erysipelas	459	Rheumatic fever	165
Gastroenteritis	2,650	Scabies	4,791
Gonorrhea	818	Scarlet fever	628
Hepatitis, epidemic	356	Syphilis	142
Impetigo contagiosa	4,461	Tuberculosis (all forms)	366
Influenza	2,765	Typhoid fever	2
Lymphogranuloma inguinale	1	Weil's disease	1
Measles	101	Whooping cough	2,233

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

India—Calcutta.—Cholera has been reported in Calcutta, India, as follows: Weeks ended—March 8, 1947, 77 cases, 45 deaths; March 15, 1947, 139 cases, 48 deaths.

Plague

British East Africa—Uganda—Mengo District.—For the week ended March 1, 1947, 1 case of plague was reported in Mengo District, Uganda, British East Africa.

Peru.—For the month of January 1947, plague was reported in Peru, by Departments, as follows: Libertad, 4 cases, including 1 case reported in the city of Trujillo; Piura, 36 cases, 2 deaths.

Turkey (in Asia)—Urfa Province—Akcakale.—On March 14, 1947, 3 cases of plague with 3 deaths, were reported in Akcakale, Urfa Province, Turkey.

Smallpox

China—Shanghai.—For the week ended March 15, 1947, 103 cases of smallpox were reported in Shanghai, China.

India—Calcutta.—Smallpox has been reported in Calcutta, India, as follows: Weeks ended—March 8, 1947, 83 cases, 58 deaths; March 15, 1947, 142 cases, 125 deaths.

Indochina (French)—Cochinchina, Saigon.—For the week ended March 8, 1947, 50 cases of smallpox were reported in Saigon, Cochinchina, French Indochina.

Tunisia.—For the month of January 1947, 211 cases of smallpox were reported in Tunisia.

Typhus Fever

Ecuador.—For the month of February 1947, 66 cases of typhus fever with 2 deaths were reported in Ecuador, including 25 cases with 1 death reported in Quito, and 5 cases reported in Manta, Ecuador.

Eritrea.—For the week ended March 1, 1947, 65 cases of typhus fever with 5 deaths were reported in Eritrea.

Guatemala.—For the month of January 1947, 49 cases of typhus fever with 9 deaths were reported in Guatemala, including 4 cases with 1 death reported in the city of Guatemala.

Tunisia.—For the month of January 1947, 40 cases of typhus fever were reported in Tunisia, by regions as follows: Bizerte, 2 cases, Gabes, 11 cases, Le Kef, 3 cases, Sfax, 2 cases, Sousse, 13 cases, Tunis, 9 cases.

Yellow Fever

Colombia—Antioquia Department—Pavarandocito (region of).—According to information dated March 27, 1947, 3 cases of yellow fever with 1 fatality (the last reported case occurring on March 14, 1947) were reported in the Pan American Highway camp, about 95 air miles northwest of Medellin in the region of Pavarandocito, Antioquia Department, Colombia. Precautionary measures were stated to have been taken.

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FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Public Health Reports

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A Mobile Laboratory and Field Table

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Public Health Reports

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THE CONTROL OF HOUSEFLIES BY DDT SPRAYS[1]

By W. C. BAKER, *Senior Assistant Sanitarian (R)*, H. I. SCUDDER, *Senior Assistant Sanitarian (R), and* E. L. GUY, *Engineering Aide, United States Public Health Service*

Until the advent of DDT, the control of houseflies was based primarily on mechanical and cultural control methods, space sprays, and stomach poisons. Since DDT has become available, it is now possible for an individual, a business, or a community to enjoy a degree of freedom from flies not likely to be attained by older methods. In initial performances as a residual insecticide, single DDT treatments have exhibited excellent control against houseflies for a period of several months. The fact that houseflies have been proven capable of transmitting such diseases as typhoid, amoebic and bacillary dysentery, and diarrhea, and that they are unsightly and a general annoyance, makes this new agent a boon to communities and industries having fly problems.

The investigations covered in this paper were made at milk and food establishments to determine the effective duration of DDT as a residual spray deposit on surfaces, the amount of treatment necessary to obtain practical control, and the most effective method of application.

MATERIALS AND METHODS

In most of this work, a xylene-DDT-emulsifier concentrate was prepared as follows:

DDT (technical grade)	pounds	3
Xylene (industrial grade)	quarts	3
Triton X-100[2]	fluid ounces	6

[1] From Communicable Disease Center, Technical Development Division (Savannah, Ga.), States Relations Division.

[2] An aralkyl-polyether alcohol.

The materials mixed in the above proportions made slightly over 1 gallon of 35-percent-DDT concentrate [3], and water was added to obtain the desired concentrations. The odor from the diluted xylene was slight, so that in rooms with an open door or window it soon dissipated, and the spray deposit dried within 20 to 30 minutes. The quantities of the emulsion applied to surfaces were standardized to give a deposit of 200 mg. DDT per square foot.

A second DDT material that proved very satisfactory under certain conditions was a wettable powder consisting of 50 percent DDT and 50 percent inert ingredients. The wettable DDT may be added directly to water, and with sufficient agitation, used immediately for spraying. As the wettable powder forms a suspension spray, some agitation should be maintained to prevent its settling out in the spray tank. The fine screens of the spray line should be removed prior to operation to prevent the accumulation of suspended particles and thus the stopping of the spray line. A suspension containing 2½ percent DDT was used.

The DDT-wettable-powder spray is applied in a manner similar to the DDT-xylene-water emulsion. Upon drying, the inert ingredients remain on the surface as a white, heavy, bloom-like residue. Consequently, its use is limited to interiors having rough or semifinished material where the residue is not objectionable. The wettable powder may be used with considerable satisfaction in dairies, but not in better-class homes or in restaurants.

EQUIPMENT

In the control of houseflies with DDT sprays, both hand and power sprayers were used. In small establishments where only a small amount of spray material was needed, a 2-to-4-gallon-capacity compressed-air garden-type hand sprayer was convenient and effective. In larger establishments, or in the treatment of several places, an orchard-type power sprayer was found to be more economical in labor and time. When less than 15 gallons of spray material was needed, a small drum was substituted for the regular 50-gallon tank.

In all operations, nozzles producing a fan-shaped spray pattern were used. The aperture size of the nozzle was dependent upon the kind of surface to be treated and the amount of liquid to be applied per square foot. In homes and restaurants where there were high-gloss paints and varnishes, a 65–0.15 [4] nozzle was used. On such surfaces, a 7½-percent-DDT emulsion was applied in such a manner that the surface held many small minute droplets which, upon drying,

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[3] When the term "percent" is used, it means so many grams of solid per 100 cc. of solution.

[4] When such figure designations are used for nozzles, the first portion of the figure refers to the angle of the fan pattern and the latter portion to the rate of discharge in gallons per minute at 40 pounds' pressure.

left no objectionable residue (fig. 1, left). The application of a sufficient quantity of spray to cause a run-off should be avoided, but if it does occur, the spray should be allowed to dry thoroughly and should then be rubbed briskly with a clean dry cloth to remove the excess spray deposit.

On roughly painted and metal surfaces, an 80–0.2 nozzle was used, and a 5-percent emulsion was applied at the rate of 1 gallon per 946 square feet of surface treated.

On rough or semifinished unpainted wood surfaces which absorb considerable amounts of spray, a 50–0.4 or 65–0.4 nozzle was employed, and a 2½-percent-DDT emulsion was used at the rate of 8 cc. per square foot, or 1 gallon per 473 square feet, of surface treated. In applying the spray at this dilution and quantity, the surface was wetted to the point of run-off, and the deposit formed was not objectionable. In practice, the rate of DDT application was governed by the degree of surface wetness with the proper nozzle and spray dilution, rather than by time and area calculations.

TREATMENT EVALUATION

To obtain a basis for the most efficient application of a residual spray, a study was made of the resting habits of the housefly. Night-time and daytime observations and studies of the accumulations of fecal spots indicated that the housefly prefers to alight on strings, wires, edges of projections, beams and supports, and along the cracks between sprung boards, particularly on the ceilings. Consequently, in all applications particular attention was given to spraying these locations (fig. 2).

In evaluating the control obtained, a grill device (*2*) was used to sample the pretreatment and posttreatment populations at various points of concentration. Two different-sized grills were used, a large 36-inch grill in dairy barns and outdoors, and a smaller 18-inch grill in restaurants and homes. Since fly concentrations shift throughout the day from one location to another on any given premise, certain sampling areas were established, and within these areas grill counts were made at points where the maximum concentration of flies was observed. Counts were made at weekly intervals and, because of the diurnal fluctuations in fly populations, at about the same time of day.

THE CONTROL OF HOUSEFLIES IN DAIRIES

Procedure and results.—The aim of controlling houseflies in dairies is primarily to decrease the possibilities of transmitting fly-borne diseases through milk contamination. With this point in mind, it was desirable to determine the extent of DDT spraying necessary to

reduce flies to a practical level of control, the most effective means of application, and the duration of effectiveness of a single treatment.

The pretreatment and posttreatment population levels were determined by the grill method, to which reference has previously been made. The sampling areas were the barn entrances, the center half of the barn floor, the stanchions, the entrance to the milk room (fig. 3), the milk room itself, and the feed storage room or shed. At each location, five counts were made to secure an adequate sample. The highest count at each location was taken, and from these seven highest counts, the four highest were averaged. This average or index figure was used as the weekly fly index for the establishment. The arbitrary selection of such a figure was based on the belief that the larger concentrations of flies give a closer indication of the maximum disease-transmission potentialities of the fly population.

In the dairies, a 2½-percent-DDT emulsion was applied with a power sprayer to the favored resting places of the flies, at the rate of 200 mg. per square foot. For experimental purposes, a 65–0.4 nozzle operating under 70–80 pounds pressure was used to obtain a more accurate application. Under nonexperimental conditions, an orchard-type spray nozzle with a larger aperture and much higher pressure could be effectively used.

In most dairies, the milk room was left untreated because of the possibility of contaminating the milk. The feed room was also left untreated because the dusts arising during the mixing of feed readily cover any DDT deposit.

An experiment using DDT emulsions was set up to compare the value of a partial and complete premise treatment, the effective duration of an over-wintering treatment, and an early season treatment. To secure information on the comparative value of partial and complete premise treatment, three dairies were handled under the conditions shown in table 1. All dairies were treated to the point of "run-off" (fig. 1, right) with a 2½-percent-DDT emulsion (200 mg. DDT per square foot). The partial treatment consisted of spraying only the milking barn in dairy No. 10, and only the horse, calf and bull sheds in dairies No. 26 and No. 12. In the check dairy, no attempt was made to interfere with the dairyman's usual control practices of using sodium-arsenite syrup on burlap.

The results of the partial dairy treatments during a period of 3 months subsequent to treatment demonstrated that, although the reduction of flies as shown by grill counts was roughly 50–70 percent, still the remaining population exceeded an index of 10 flies, a number selected arbitrarily as the upper level of satisfactory fly control A later complete premise treatment gave good control for the remaining 3 months of the fly season.

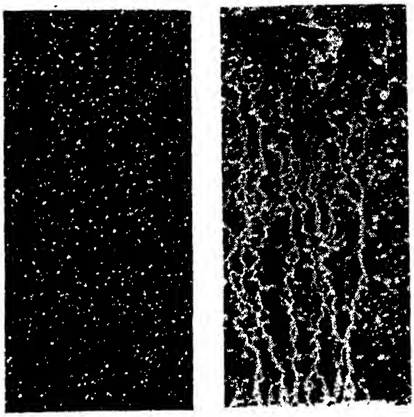

FIGURE 1.—Proper application of a DDT spray emulsion is shown on the left. Overspraying, or treatment to the point of "run-off," is shown on the right.

FIGURE 4.—Food strewn on the ground and sifting through the board runways provide the excellent fly-breeding conditions shown in this photograph.

FIGURE 2.—Careful attention must be given to the spray treatment of all edges on which flies may rest. The photograph shows proper treatment of overhead resting places in a dairy.

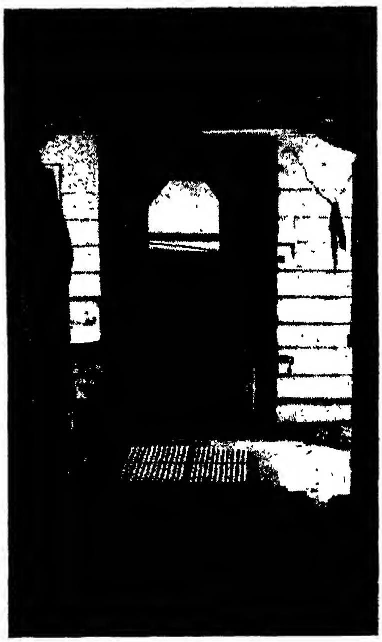

FIGURE 3.—Sampling point for the large fly grill on the walk just outside the milkroom door of a dairy.

TABLE 1.—*A comparison of monthly fly indices in dairies given partial and complete premise treatments with a 2½-percent-DDT emulsion at the rate of 200 mg. DDT per square foot*

Treatment period	Dairy No. 10	Dairy No. 26	Dairy No. 12	Dairy No. 2
	Sanitary conditions			
	Poor	Poor	Poor	Poor
PRETREATMENT-PERIOD FLY INDEX				
March–April (5 weeks)	99.2	95.8	69.5	31.3
May (4 weeks)			128.6	
	Partial treatment date			
	April 12	April 20	May 22	None
PARTIAL-TREATMENT FLY INDEX				
May (5 weeks)	57.7	25.4		112.3
June (4 weeks)	56.8	43.6	34.4	226.1
July (3 weeks)	47.5	42.5	27.2	102.5
	Complete premise treatment date			
	July 20	July 26	July 20	None
POSTTREATMENT-PERIOD FLY INDEX				
July (2 weeks)	6.7		2.9	
August (4 weeks)	7.9	8.3	2.4	99.8
September (4 weeks)	9.7	13.4	5.8	106.9
October (5 weeks)	10.7	9.9	5.5	47.7

A study of DDT applications in late autumn was made to determine the reduction of the succeeding spring-fly population in a dairy, by controlling the flies present during the late autumn and those that emerged during warm periods throughout the winter. To supplement such a treatment in a dairy with poor sanitary conditions, a second treatment was made in one dairy in the early spring. It was thought that a properly timed treatment might effectively reduce the hold-over population that serves as a nucleus for the next season's population.

Consequently, in two dairies such treatments were made with the results obtained as shown in table 2.

In view of the control results shown for these dairies, it was concluded that under the existing sanitary conditions, complete residual DDT treatments of premises in late fall and early spring are not capable of holding the spring population within a satisfactory level of control for more than 6 weeks.

The period of duration for which a DDT spray maintains the fly population within satisfactory levels was observed at seven dairies in which complete premise treatments were made in early April.

TABLE 2.—*Fly-control indices obtained in dairies of varying sanitary conditions treated with DDT in late autumn to control the early spring build-up of house-*

Treatment period	Period fly index, 1946		
	Dairy No. 20	Dairy No. 21	Dairy No. 16
	Sanitary conditions		
	Poor	Fair	Poor
	Type of treatment		
	Complete premise	Dairy barn only	None
	Treatment date		
	Oct. 10, 1945 Feb. 28, 1946	Oct. 11, 1945	None
March 23–May 14 (9 weeks)	9.8		24.9
May 21–July 16 (9 weeks)	38.3		56.1
March 22–May 5 (7 weeks)		12.4	17.7
May 10–June 19 (9 weeks)		48.0	54.0
	Treatment date		
	July 19	June 19	None
July 24–Oct. 8 (11 weeks)	20.6		50.1
June 27–Oct. 1 (14 weeks)		10.4	54.1

In four dairies selected for treatment (Nos. 18, 19, 27, 28) and in a check dairy (No. 22) the sanitation was very poor. In the check dairy, no attempt was made to interfere with the dairyman's practice of poisoning flies or using his own customary method of control.

In dairy No. 19, which had exceptionally poor sanitation, satisfactory control was obtained for only 5 weeks, whereas in dairies Nos. 18, 27, and 28, satisfactory control was obtained for 8 weeks (table 3). Although the treatment was definitely killing large numbers of flies after 8 weeks, the breeding and feeding areas were so extensive that the slower killing rate of the aging DDT did not reduce the fly population to the level arbitrarily established for satisfactory fly control.

To determine if the slower killing rate of DDT was responsible for the unsatisfactory control obtained, these dairies were retreated in early September. Dairies Nos. 18 and 27 were given complete premise treatments, and dairies Nos. 19 and 28 were given partial treatments, in which the diary barn alone was sprayed. All four dairies showed a considerable decrease in fly population during the succeeding month. When a complete premise treatment was made,

TABLE 3.—*A comparison of monthly housefly indices in dairies given partial or complete premise treatment with 2½-percent-DDT emulsion applied at the rate of 200 mg. DDT per square foot*

Month	Check dairy	Treated dairy					Check dairy	Treated [1] dairy	
	Dairy number								
	22	18	19	27	28	17	3	11	4
	Monthly averages of weekly fly indices								
April	32.9	8.8	15.9	7.2	7.8	12.6	16.9	2.0	6.0
May	54.0	18.5	19.6	12.1	5.2	12.7	34.6	7.7	11.8
June	90.6	21.5	40.1	36.6	43.8	17.9	55.2	18.4	19.2
July	68.6	24.0	29.5	27.4	45.3	19.6	30.8	11.0	11.2
August	45.9	31.7	35.1	27.6	37.2	36.1	26.8	10.5	9.3
September	58.7	[2] *6.0*	*17.6*	*3.5*	*13.6*	34.6	17.0	7.5	9.6
April–September average	--------	--------	--------	--------	--------	--------	34.1	10.1	11.2

[1] Partial treatment consisting of milking barn only.
[2] Italicized figures are indices subsequent to late season treatment.

the indices were reduced far below the maximum grill-count allowance of 10 flies, but when the milking barn alone was sprayed, the population was not reduced to that level.

These studies indicate that in dairies in which sanitation is very poor, the use of a DDT-xylene-Triton emulsion, containing 2½-percent DDT applied at the rate of 200 mg. per square foot to the milking barn and outbuildings, would give good control of flies for a period of about 8 weeks, and materially reduce the population level throughout the entire season.

In dairy No. 17, which had apparently good sanitation practices, large numbers of flies were found breeding in feed which had collected under a board walk between the barn and the feed room (see fig. 4 for a similar condition). The fly index for the latter part of March in this dairy was 115.75 flies. On April 2, a complete premise treatment was made, and although the fly population was not reduced to the satisfactory control level because of the heavy fly breeding, the reduction of flies (table 3) may be considered favorable through July.

In dairies Nos. 3, 4, and 11, the sanitation was considered good. Only the milking barns were sprayed in making a partial premise treatment in dairies Nos. 4 and 11 during the latter part of March, while dairy No. 3 was kept as a control.

The fly population in the treated dairies was kept under practical control throughout the entire season, with the exception of June, when natural population levels reached their maximum (table 3).

To compare the effectiveness of DDT wettable powder with DDT emulsion, two dairies were sprayed on June 21 with each of the respective formulae, both at the rate of 200 mg. DDT per square foot.

Subsequent to treatment, a marked reduction in the number of flies was observed in the weekly inspections (fig. 5). Throughout the

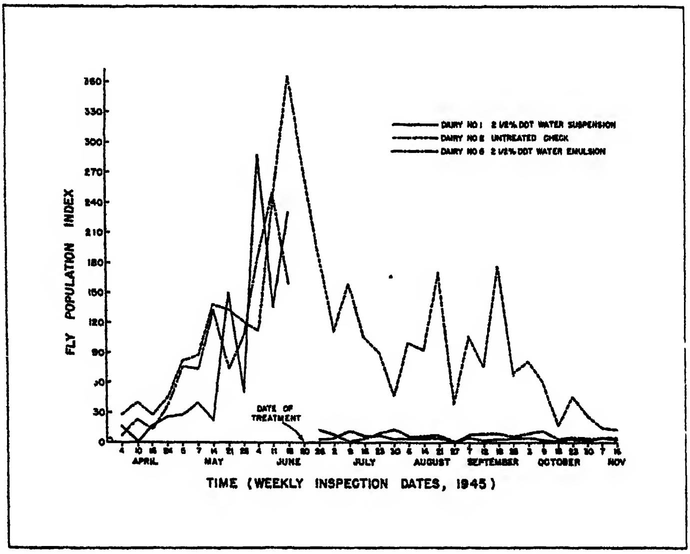

FIGURE 5.—DDT control of houseflies in two sprayed dairies, versus one check dairy, using different vehicles as indicated. DDT dosage, 200 mg. per square foot. Fly-population index computed on basis of grill-sampling technique.

remainder of the season, the fly-population levels in the emulsion and wettable-powder-treated dairies ran parallel to each other and well within the range of satisfactory control. Both materials were considered equal in effectiveness, and the slight variation in population levels was probably due to other factors.

Two more dairies were selected to determine the effectiveness of wettable DDT in reducing the fly population under dissimilar condi-

TABLE 4.—*Weekly indices of houseflies at two dairies before and after treatment with a 2½-percent water suspension of wettable DDT at the rate of 200 mg. DDT per square foot*

Dairy	Pretreatment weekly fly index										10-week index
	July 4	July 10	July 19	July 25	July 31	Aug. 7	Aug. 17	Aug. 23	Aug. 28	Sept. 7	
Dairy No. 3	71.0	25.7	17.5	13.7	25.7	26.0	26.3	35.7	19.0	13.5	27.4
Dairy No. 22	69.7	33.0	80.0	31.7	128.3	75.7	42.5	23.5	41.7	75.7	60.2

Dairy	Posttreatment weekly fly index									Nine-week index	
	Sept. 12	Sept. 20	Sept. 28	Oct. 4	Oct. 10	Oct. 19	Oct. 24	Nov. 1	Nov. 8		
Dairy No. 3	1.0	3.7	4.5	5.7	2.0	2.7	1.1	2.3	3.7	3.0	------
Dairy No. 22	2.5	3.0	3.3	3.3	0.3	7.5	0.8	1.3	6.5	3.2	------

tions. In dairy No. 3, a well-kept establishment, the milking barn alone was sprayed and in dairy No. 22, a very poorly kept dairy, a complete premise treatment was made. Both dairies were treated early in September with a 2½-percent suspension of the wettable DDT in water at the rate of 200 mg. DDT per square foot, and immediate and effective control was obtained (table 4).

THE CONTROL OF HOUSEFLIES IN RESTAURANTS

The use of DDT for the control of houseflies in restaurants was investigated in 16 establishments to determine both satisfactory methods of application and the degree of effectiveness of a DDT residue in reducing fly-population levels.

Procedure.—In restaurants, the high-gloss interior surfaces necessitate a spray application that will amply cover the surfaces involved without marring the finish or leaving a visible deposit. Under such circumstances, it was found that when a 5-percent spray material was used to obtain the desired deposit of 200 mg. DDT per square foot the total quantity of liquid applied to the glazed surfaces caused coalescing of spray droplets and "running" of the spray material. This oftentimes left a visible residue after drying. To overcome this condition, a xylene-Triton-X-100-water emulsion containing 7½-percent DDT was applied with a 65–0.15 nozzle having an aperture that produced an even spray pattern without solid edges. In most instances, a power sprayer was used because of its convenience as a time- and labor-saving device.

The nozzle used gives a spray pattern of many small droplets sufficiently dispersed to prevent coalescing and subsequent "running" on the verticle surfaces (fig. 1). The fairly narrow angle of the spray pattern enables the operator to manipulate the spray stream to much greater advantage in close quarters, and thus to reduce the occurrence of overlapping spray strips.

In the dining room and kitchens of all restaurants, the ceilings, walls, and any upholstery were sprayed. Cover cloths were used to prevent spray deposition on mirrors and other glass objects, table tops, food, cooking utensils, meat blocks, and food preparation tables (fig. 6). It was found desirable to treat the side walls before the ceilings, as this prevents the operator from tracking through the spray droplets falling to the floor. In those restaurants having a rear exit, the screen door and the woodwork or bricks around the outside door were sprayed.

The 7½-percent-DDT emulsion, applied at the rate of 200 mg. (3 cc.) per square foot, gave no noticeable disfigurement on a wide variety of paints and varnishes. On light-colored finishes, no exceptional caution is necessary. On dark finishes, care should be taken to

prevent overlapping of spray streams and "run-off." If "run-off" does occur, the spray material should not be touched or rubbed until dry, otherwise a white smear will result. When the spray material is permitted to dry without disturbance, the crystals remaining on the treated surface are not noticeable.

The greatest limiting factor in restaurant fly control is in making a treated surface available to flies during the day. At night, the flies rest on the ceilings and walls, and come into contact with a lethal amount of DDT, so that a treated restaurant is completely free of flies each morning. However, the flies that enter during the day have an opportunity to build up in numbers, for they may frequent food, untreated equipment, and furniture in both kitchen and dining room, without coming into appreciable contact with a treated surface until evening. Kitchens and storage areas have so much equipment and so many attractant materials that the total surface area that can be treated is relatively small and unattractive.

In each establishment, five fly counts were made with the 18-inch-square grill at points of maximum concentrations on unoccupied tables, meat blocks (fig. 7), preparation tables, soiled dishware or linen, and boxes of fruit or vegetables. The average of the highest fly count from each of the three most populated locations was used as a weekly index of the establishment. An index of three was arbitrarily selected as the upper limit of satisfactory control.

Results.—Restaurants and luncheonettes, varying considerably in type and grade, were selected for DDT treatment at various times during the season. In a group of better-grade restaurants having proper screening, good sanitation, and air conditioning, a treatment of the kitchen, food-preparation rooms, and the rear entryway, including the screen door and outer area around it, was found to give good control for a period of 4 months and in some instances for the entire season (table 5, establishments Nos. 1, 4, 8, 16, 20). In a newly opened restaurant, No. 16, the air-conditioning system broke down 6 weeks after treatment, and the doors were opened to the street. Following this, the influx of flies to the main dining room rose above an index of three flies per grill count, until the air-conditioning system was restored to working order. Restaurant No. 8 had no air-conditioning system, but in its place had large fans which prevented the concentration of flies.

In a second group of restaurants (Nos. 2, 6, 9), the doors of the establishment were opened to the streets at all times. In these restaurants, the main dining room was treated, as well as the kitchen, preparation rooms, and rear entryway. Under such conditions, the treatment maintained a satisfactory fly level for approximately 3 months, after which retreatment was necessary. In restaurant No. 6,

FIGURE 6.—Restaurant table, mirrors, and record player covered before spraying side walls and booths of a restaurant.

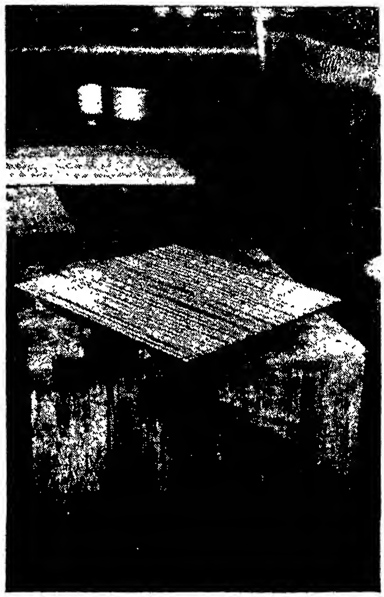

FIGURE 7.—Use of the small fly-sampling grill to estimate fly density in a restaurant kitchen, in this instance on the meat block.

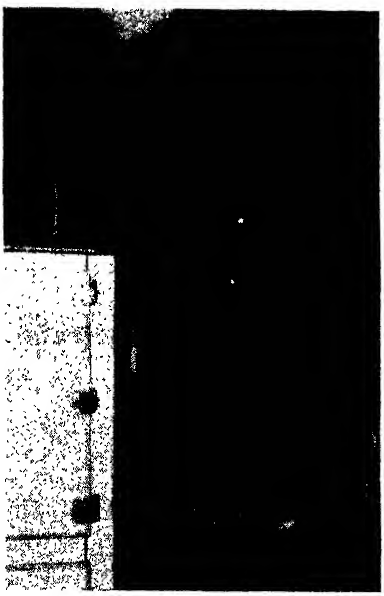

FIGURE 8.—DDT-treated strings hanging in a small kitchen to control the flies.

FIGURE 9.—Loosely bricked alley behind a restaurant. Flies were found breeding heavily in garbage washings collected between these bricks.

poor control was caused by the acquisition of a flock of chickens, which were housed close to an open door leading to the kitchen. Under such conditions, a considerable number of flies entered the kitchen throughout the day.

In a widely divergent group of institutions in which the kitchen, food-preparation rooms, and rear entryway were treated, the occurrence of certain special conditions prevented satisfactory control until corrections were made. In a large shipyard cafeteria, open rear and front doors, and a scattering of food on the premises necessitated the additional treatments of the main dining room and a canteen. At a hotel (No. 12), the presence of garbage near a frequently opened rear door and a trash pile nearby prevented satisfactory control in spite of a high kill. In a hospital (No. 13), portions of the kitchen were painted 1 month after treatment, thus covering the DDT, so that satisfactory control was not again obtained until a second treatment was made. At an orphanage (No. 14), the fly population in the kitchen was observed to fluctuate consistently with that of a nearby dairy. Both kitchen and dairy were treated in July, and good control was obtained for the remainder of the year.

In drive-in restaurants and in night clubs, which are usually located on the outskirts of a city, a treatment of the kitchen, food-preparation rooms, the entryways, and the sheltered areas open to the outside have given satisfactory control.

At a crossroads on the edge of the city, a newly opened drive-in restaurant (table 5, No. 18) was immediately subjected to a great influx of flies, and a night club (No. 19) on an opposite corner harbored a considerable number of flies in spite of their fly-control practices. On a third corner, a fruit-and-vegetable stand was treated as an adjunct to the control procedure used for the drive-in restaurant and night club. Here, considerable fly breeding was found in decaying fruits and vegetables thrown into a depression to the rear of the stand. Further to the rear of the stand, there was a 100-head hog farm. A treatment of the walls and ceiling of both the outer shelter and the enclosed part of the fruit-and-vegetable stand reduced the population from an average of 7.7 flies for the pretreatment weekly indices to an average of 1.1 flies for the posttreatment weekly indices.

THE CONTROL OF HOUSEFLIES IN SMALL FOOD SHOPS WITH DDT-TREATED STRINGS

Many small food shops that now depend on a small hand sprayer, fly-paper rolls, or manual elimination for the control of flies, will not obtain proper equipment to make a complete or partial premise treatment with DDT. Since the housefly prefers to rest on the edges of various structures, on strings, and on wire, it was thought that

TABLE 5.—*Weekly indices of fly populations as determined by the grill-sampling device in food establishments treated with a 7½-percent-DDT emulsion at the rate of 200 mg. of DDT per square foot*

[Lines separating figures within the columns indicate time of treatment]

Date (1945)	Establishment No.													
	1	2	6	8	9	4	11	12	13	14	16	20	18	19
Mar. 19-24	6.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
26-31	27.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Apr. 2-7	0	40.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
9-14	0	12.0	-----	-----	-----	11.7	-----	-----	-----	-----	-----	-----	-----	-----
16-21	1.0	17.0	-----	-----	-----	16.3	-----	-----	5.6	-----	-----	-----	-----	-----
23-28	0	31.0	-----	-----	-----	10.3	-----	-----	3.0	-----	-----	-----	-----	-----
May 1-5	0	0	-----	-----	7.5	18.7	-----	-----	2.3	7.5	-----	-----	-----	-----
7-12	0	2.0	12.3	-----	3.0	11.3	13.3	13.0	9.6	3.0	-----	-----	-----	-----
14-19	2.7	2.0	10.0	-----	3.5	9.0	13.0	16.3	3.0	3.5	-----	-----	-----	-----
21-26	0	.7	4.3	-----	5.0	9.0	17.7	27.0	7.0	5.0	-----	-----	-----	-----
28-June 2	.7	.7	9.3	-----	0	7.0	-----	20.0	2.0	0	-----	-----	-----	-----
June 4-9	-----	-----	-----	-----	3.5	-----	16.7	26.0	2.3	3.5	-----	-----	-----	-----
11-16	.3	.3	3.0	-----	1.0	12.3	11.0	16.0	0	0	-----	-----	-----	-----
18-23	.3	0	4.0	-----	4.3	9.0	-----	9.0	1.0	3.5	-----	-----	-----	-----
25-30	.3	.3	6.0	10.0	4.3	4.0	.7	5.7	.7	0	0	-----	-----	-----
July 2-7	0	.7	5.7	10.3	3.0	6.3	5.3	2.0	5.0	5.5	0	-----	-----	-----
9-14	0	2.0	7.7	6.3	3.3	0	.7	6.3	2.7	8.5	0	-----	-----	-----
16-21	0	1.3	0	7.3	.3	0	1.0	2.6	1.6	.5	0	-----	-----	-----
23-28	0	2.0	2.0	2.3	1.3	0	.7	13.3	4.3	1.5	-----	-----	12.3	-----
30-Aug. 4	2.0	5.0	-----	-----	-----	0	-----	7.0	7.3	-----	-----	-----	32.7	10.0
Aug. 6-11	.7	5.0	3.3	0	.7	0	0	5.0	5.3	0	3.0	-----	19.7	7.7
13-18	0	4.0	4.0	.6	2.3	0	-----	8.3	6.0	2.0	2.7	0	10.0	9.3
20-25	0	.7	5.3	0	1.6	0	.7	6.3	0	0	4.0	0	8.0	7.0
27-Sept. 1	0	1.3	4.0	1.0	1.6	0	0	5.3	2.0	0	3.3	0	0	0
Sept. 3-8	0	1.3	4.0	1.6	1.0	0	2.0	5.3	.7	0	1.0	0	1.0	0
10-15	0	.7	4.0	1.0	2.3	0	2.0	4.3	.7	0	1.7	0	.7	.3
17-22	0	.7	-----	1.0	2.3	0	0	4.6	.3	1.5	1.3	0	0	.3
24-25	.7	.7	-----	.7	2.3	0	.7	4.6	.7	.5	1.7	0	1.0	-----
Oct. 1-6	0	.3	-----	.7	2.3	0	-----	7.6	.7	-----	1.0	0	.3	.7
8-13	0	.3	-----	0	1.3	0	2.0	5.3	.7	3.0	.3	0	0	.7
15-20	0	0	2.3	0	1.6	0	-----	2.6	-----	-----	1.3	0	-----	-----
22-27	0	0	2.7	0	1.6	0	-----	7.3	-----	5.5	-----	0	-----	3.0
29-Nov. 3	-----	-----	-----	-----	-----	-----	.7	5.6	1.0	-----	1.0	0	.7	.7

advantage might be taken of this characteristic by placing DDT-soaked strings in such stores where the flies might rest on them. In several of these smaller food shops, DDT-treated cords were used to determine the effectiveness of their use in reducing the population of the housefly to a satisfactory level.

Procedure.—Net cord was soaked in a 35-percent-DDT-xylene solution and hung to dry, so that DDT crystals remained attached to the surface. These cords were then cut to convenient lengths and substituted for the electric-light pull cords. Other strings were run along the chains holding suspended display shelves or placed in other suitable inconspicuous locations. In the kitchens and food-preparation rooms, the treated cord was hung from the ceiling where it would

be accessible to the flies, but out of the way of the employees (fig. 8). Forty-five to sixty feet of treated cord was used in each establishment.

The method of sampling the fly population at points of high concentration was similar to that used in large restaurants.

Results.—In small shops serving food, the use of DDT-coated strings has given good control of houseflies under ordinary conditions. In three shops (table 6, S1, S3, and S4), pretreatment weekly-index averages of 5.2, 4.5, and 6.3 flies were reduced to 0.8, 0.4, and 0.6 flies, respectively.

In an unscreened shop with a high exterior fly population (table 6, S5), the coated strings did not afford a resting area for the large influx of flies sufficient to reduce the population to any great extent.

In an employees' dressing room (table 6, S2), adjacent to the wholesale-meat sales room of a large fly-infested abattoir, 60 feet of treated cord was strung horizontally, close to the ceiling. A fly average of 90.7 for 4 pretreatment weekly indices was reduced to a fly average of 10.1 for 10 posttreatment weekly indices.

TABLE 6.—*Pretreatment and posttreatment weekly indices of housefly population levels in small food shops in which DDT-coated strings were hung for the control of houseflies*

[Lines separating figures within columns indicate time of treatment]

Month	Shop No.				
	S1	S2	S3	S4	S5
June	4.6	...	...	...	...
	8.3	...	...	...	...
	5.0	...	...	...	...
	5.0	...	...	...	...
July	6.3	...	...	...	...
	4.0	80.0	...	...	...
	4.3	100 0	...	...	...
	7.3	70 0	4.0	...	...
August	3.0	113 0	8.0	7.0	...
	4.3	3.5	2 3	6.0	...
	5.0	2 5	3.7	6.3	...
	1.6	6.0	5.0	7.0	...
September	1.6	5.0	0.3	1.0	...
	1.0	6.0	0.3	0.6	...
	0.6	15.0	0.6	1.0	...
	0.6	28.0	0.3	0.6	7.3
October	1.3	23.0	1.0	0	5.3
	0.6	7.0	0	1.3	6.3
	0.6	...	0.6	0.6	5.6
	0.3	...	0.3	0	5.6
	0.6	...	0	0.6	8.0

THE USE OF DDT AS A COVER SPRAY FOR EMERGING ADULTS

Since special breeding conditions often exist in the environs of canneries, grain and feed mills, dumps, garbage stations, etc., preliminary work was done at a grain and feed mill and at a restaurant

garbage station to determine the value of DDT as a cover spray and its ability to exercise some degree of control over fly emergence from breeding areas.

Procedure and Results.—A study of a large restaurant showed that most of its flies entered through a rear service door, near which the restaurant garbage containers were kept on a low cement platform adjoining a brick-paved alley (fig. 9). Over a period of time, the garbage-can washing operations flushed a large quantity of food particles into the street, where the material packed between the bricks and supported a considerable population of fly larvae. The cement platform and a surrounding 60- by 22-foot section of the alley were given a cover-spray treatment with a 0.5-percent-DDT emulsion at 200 mg. DDT per square foot. The high dilution was used to promote penetration of the spray into the soil between the bricks, thus making sufficient DDT available for control of the emerging adults. Since it had been shown (*1*, *3*) that DDT in the presence of wet soil loses its toxicity within a relatively short time, four applications were made at 3-week intervals. A 5-week pretreatment housefly index of 48.4 was reduced in four 3-week posttreatment periods to indices of 12.7, 10.5, 8.7, and 10.3 flies, respectively (table 7). After the fourth treatment, 7 weeks were allowed to elapse before another treatment was made, and in this period there was no appreciable increase in the fly index.

In the final application, the alley side of the restaurant building was treated for its full length to a height of 9 feet, in addition to the treatment of the paved-alley surface. In the subsequent 5 weeks, there was a reduction in the index from 12.3 to 6.0 flies.

Further use of a DDT cover spray for housefly control was made on a railroad loading area and on a dumping area for floor sweepings at a wholesale grain-and-feed-distribution plant. In both locations, considerable quantities of spilled grain and meal accumulated and furnished a media that produced vast numbers of flies. In addition to the breeding areas, the drippings from a large elevated molasses-storage tank attracted flies and supplied an ample source of food.

TABLE 7.—*Housefly indices at a restaurant garbage station in an alley treated with a ½-percent-DDT emulsion cover spray at the rate of 200 mg. of DDT per square foot. Treatments were made at 3-week intervals*

Item	Date										
	Apr. 4–May 4	Treated May 4	May 8–24	Treated May 25	June 2–14	Treated June 18	June 21–July 7	Treated July 9	July 12–25	July 31–Aug. 23	Treated Aug. 29	Aug. 30–Sept. 26
Number of weeks per period	5		3		3		3		3	4		5
Period fly index	48.4		12.7		10.5		8.7		10.3	12.3		6.0

In the first three applications, a 50–0.4 nozzle was used to treat the entire breeding area with a 0.5-percent-DDT emulsion at the rate of 300 mg. of DDT per square foot. Although the use of a nozzle with such a low delivery rate would not be economically sound on a commercial basis, it did permit a more accurate application of the spray for experimental purposes. In the fourth application, an orchard-type spray gun was used at 200 pounds' pressure, and in addition to the cover spray, the walls and ceiling for the entire length of the loading platform were given a residual treatment. For the latter, a 2½-percent-DDT emulsion was used and was applied with a 50–0.4 nozzle at 70 pounds' pressure.

The treatment intervals were varied to permit observations on the effective duration of a given treatment and on the variability of fly populations between treatments. In determining fly populations by the grill method, the inspection areas were divided into two categories: (1) within the limits of the building, including the interior, the entrances, and the sheltered portion of the loading platform, and (2) outside the building at points of maximum fly concentrations, along the railroad track, the loading platform, near the molasses tank, and on the dumping ground for the floor sweepings.

Four cover-spray treatments were made on April 21, May 12, June 16, and August 31, respectively. After each cover-spray treatment, a satisfactory reduction in the fly population was secured (table 8). When a cover spray alone was used, the population rose rapidly after 5 weeks. When a residual treatment was applied in conjunction with the cover spray, the period of control was lengthened considerably.

TABLE 8.—*Period fly indices inside and outside the building limits at a wholesale grain- and feed-distribution plant where fly-breeding wastes were treated with a cover spray of ½-percent-DDT emulsion applied at the rate of 300 mg. DDT per square foot*

Item	Date										
	Apr 10–20	Treated Apr. 21	Apr. 27–May 9	Treated May 12	May 16–June 13	Treated June 16	June 20–July 24	Aug. 1–29	Treated Aug. 31	Sept 7–Oct. 4	Oct. 10–Nov. 8
Number of weekly inspections	2		3		5		5	5		5	5
Fly index inside the limits of building	56.5		11.0		14.2		12.0	42.1		8.3	12.9
Fly index outside the limits of building	259.5		120.7		47.8		30.5	246.2		23.9	16.3

SUMMARY

DDT has proved to be very effective in the control of houseflies when employed not only for a residual-spray treatment in dairies and restaurants, but also on DDT-impregnated strings hung in small

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food shops, and in a dilute cover spray, used to kill emerging adult flies at an alley garbage station and an industrial plant.

In dairies, a 2½-percent-DDT-xylene-Triton emulsion was used at the rate of 200 mg. of DDT per square foot. Under poor sanitary conditions, treatment of the milking barn alone or of the outbuildings alone gave 50 to 70 percent control, which was not sufficient to reduce the population to a satisfactory level. A complete treatment of both barn and outbuildings usually gave satisfactory control for 3 months or more. A DDT emulsion and a water-wettable DDT-powder suspension gave comparable results when used under similar conditions and concentrations.

In restaurants, a 7½-percent emulsion was applied to the ceiling and walls of dining rooms and kitchens at the rate of 200 mg. of DDT per square foot. On high-gloss finishes, particular caution was exercised to obtain a uniformity of spray pattern and to prevent coalescing of the droplets. Excellent control was obtained for three or more months in the restaurants treated.

In small food and ice-cream shops, 40 to 60 feet of DDT-impregnated cord hung as a replacement for electric-light pull cords, along the chains of suspended display shelves, and from ceilings at locations where the cord would be accessible to the flies, gave good control when fly populations were not excessive. In shops with a great influx of flies, the treated strings did not bring the flies under satisfactory control.

Preliminary tests with DDT as a cover spray for the control of adult flies emerging from garbage cand grain wastes gave effective control. A treatment of an alley near a restaurant garbage station with a one-half-percent-DDT emulsion at the rate of 200 mg. per square foot gave effective control for 3 weeks. A treatment of grain wastes with a one-half-percent emulsion at the rate of 300 mg. per square foot gave effective control for 5-week intervals. When a 2½-percent-DDT emulsion was applied as a residual treatment to surfaces at the rate of 200 mg. per square foot to supplement the cover spray, a more rapid decrease in population and a longer period of effectiveness was obtained.

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(2) Scudder, H. I.: A new technique for sampling the density of housefly population. (To be published in Public Health Reports)

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A MOBILE, COLLAPSIBLE LABORATORY AND FIELD TABLE[1]

By George D. Clayton, *Senior Assistant Engineer (R), United States Public Health Service*

In making a comprehensive survey of industrial plants, it is sometimes necessary to spend several days taking atmospheric samples. In plants which have a large floor area, the transporting of equipment from one sampling location to another is very tiring when done manually. To conserve the time of field personnel and to minimize fatigue, a mobile, collapsible table (figs. 1, 2, and 3) was designed to transport sampling equipment from one location to another. This table has been used under field conditions and has proved a very definite aid.

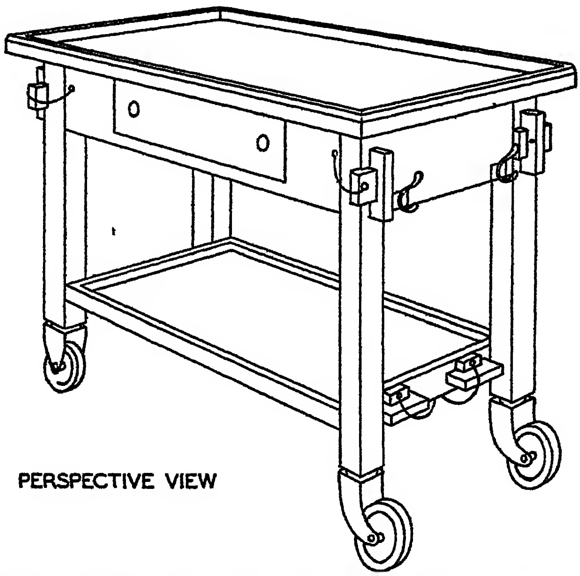
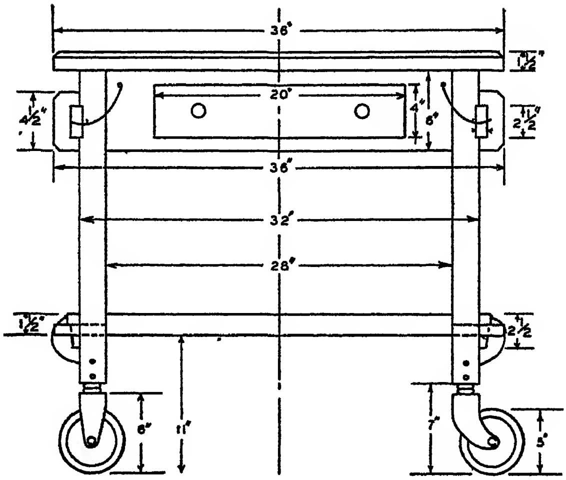


FIGURE 1.—A mobile, collapsible laboratory and field table, perspective view.

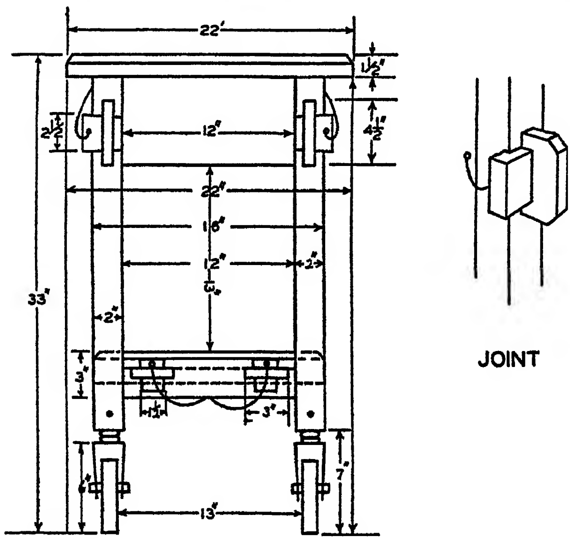
The table is designed so that it can be assembled and disassembled rapidly and easily. The size of the table is such that it will fit in the trunk compartment of most automobiles along with the other field equipment. It is constructed of seasoned oak, stained, and then waxed. No paint nor varnish is used, as it is thought this would hinder the assembling and disassembling process. One-inch ledges are placed around the top and shelf of the table to prevent the dropping of small objects on the floor. Electrical cords and rubber hoses may be hung on hooks which are provided on either end of the table. A drawer is provided in the top section to carry stop watches, notebooks,

[1] From the Industrial Hygiene Division, Bureau of State Services.



FRONT VIEW

FIGURE 2.—A mobile, collapsible laboratory and field table, front view.



SIDE VIEW

FIGURE 3.—A mobile, collapsible laboratory and field table, side view, and expanded drawing of wedge joint.

and small tools. The principle of wedges is used in the construction of the table, since this principle is found most satisfactory in providing strength for the table while in use and for ease in disassembling it. The two casters on the front of the table are stationary and the back two are swivel. However, it is felt that all four casters should be of the swivel type to allow the table to be maneuvered in a smaller area.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED APRIL 5, 1947

Summary

A net decline in the incidence of influenza was reported for the country as a whole. Increases were recorded, however, in the South Atlantic and East South Central areas. A total of 35,939 cases was reported, as compared with 48,968 last week (in both instances exclusive of Kentucky, where a sharp decline in "upper respiratory infections" was indicated). The 5-year (1942–46) median is 2,148, and the largest number recorded for a corresponding week of the past 12 years was 9,740, reported in 1939. Of the 15 States reporting currently more than 196 cases, the 8 showing increases reported 16,732 (last week 12,234). The 13 States reporting more than 282 cases each are as follows (last week's figures in parentheses): *Increases*—Michigan 332 (78), Kansas 1,634 (926), Virginia 4,153 (3,986), West Virginia 3,832 (2,474), South Carolina 3,009 (2,305), Tennessee 1,276 (1,125), Alabama 2,061 (1,085), Mississippi 435 (255); *decreases*—Iowa 3,842 (6,036), Georgia 502 (805) Arkansas 3,167 (4,576), Oklahoma 2,282 (6,891), Texas 7,144 (12,332). The total for the year to date is 242,601 (as compared with 177,855 for the same period last year), of which 202,010 cases, or 83 percent, occurred in the past 5 weeks. The respective corresponding percentages in 1946, 1945, and 1944 are 10, 26, and 5. The total for the 36-week period since the average week of seasonal low incidence (last week of July) is 275,576, as compared with 540,103 for the same period last year and a 5-year median of 100,346.

Only 3 cases of smallpox were reported during the week; 2 in Ohio and 1 in Kentucky. The 9 cases reported in Texas last week occurred in Dimmit County. A delayed report has been received of 4 cases of smallpox from imported infection, with 1 death, occurring in New York City during the period March 5–24.

Deaths recorded during the week in 93 large cities of the United States totaled 10,193, as compared with 10,820 last week, 9,037 and 9,121, respectively, for the corresponding weeks of 1946 and 1945, and a 3-year (1944–46) median of 9,121. The total for the year to date is 141,652, as compared with 141,613 for the corresponding period last year.

*Telegraphic morbidity reports from State health officers for the week ended Apr. 5, 1947, and comparison with corresponding week of 1946 and 5-year median**

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46
	Apr. 5, 1947	Apr. 6, 1946		Apr. 5, 1947	Apr. 6, 1946		Apr. 5, 1947	Apr. 6, 1946		Apr. 5, 1947	Apr. 6, 1946	
NEW ENGLAND												
Maine	0	4	0	1	2	1	172	26	26	0	0	1
New Hampshire	0	0	0	1	1	------	37	17	17	0	0	0
Vermont	0	0	0	38	------	------	253	10	56	0	0	0
Massachusetts	13	6	6	------	------	------	390	1,463	1,158	3	5	5
Rhode Island	1	0	0	1	2	1	162	------	14	1	0	1
Connecticut	0	2	1	5	3	3	462	263	341	0	3	6
MIDDLE ATLANTIC												
New York	23	29	19	[1] 14	(1)	[1] 5	448	4,595	2,756	8	27	27
New Jersey	11	3	4	17	------	6	326	3,477	1,411	3	7	9
Pennsylvania	------	19	12	------	2	2	------	3,511	1,068	------	6	15
EAST NORTH CENTRAL												
Ohio	8	19	5	61	4	8	744	734	734	6	9	9
Indiana	11	9	6	21	49	19	57	987	226	1	4	4
Illinois	5	18	17	100	28	12	72	1,229	932	3	8	17
Michigan [2]	4	3	3	332	------	3	49	2,800	848	2	6	6
Wisconsin	9	0	3	282	36	40	382	2,840	1,627	2	4	4
WEST NORTH CENTRAL												
Minnesota	3	5	2	2	2	2	95	39	141	1	0	1
Iowa	0	6	4	3,842	------	------	251	81	221	1	2	2
Missouri	6	7	3	33	1	1	28	384	314	2	4	4
North Dakota	0	1	1	82	------	3	16	6	30	1	0	1
South Dakota	0	5	1	------	------	------	7	31	26	0	1	1
Nebraska	3	1	2	152	2	7	12	708	305	0	1	0
Kansas	5	5	3	1,634	------	4	10	1,035	566	3	6	5
SOUTH ATLANTIC												
Delaware	1	0	0	3	------	------	------	52	5	0	0	1
Maryland [2]	3	19	6	52	8	8	33	614	614	4	1	9
District of Columbia	0	0	0	------	------	------	18	284	134	0	1	1
Virginia	8	4	7	4,153	215	246	383	686	559	4	5	5
West Virginia	1	3	3	3,832	4	5	26	100	100	3	0	1
North Carolina	12	8	5	------	------	10	145	577	577	3	7	7
South Carolina	14	5	6	3,009	239	376	195	381	207	1	0	5
Georgia	2	5	3	502	8	15	212	159	161	0	1	2
Florida	7	5	2	142	2	2	89	149	149	2	4	4
EAST SOUTH CENTRAL												
Kentucky	11	8	6	**	5	4	17	255	112	3	4	4
Tennessee	7	3	5	1,276	22	48	106	252	252	1	4	5
Alabama	4	7	6	2,061	37	105	293	190	190	1	3	7
Mississippi [2]	4	5	4	435	------	------	25	------	------	1	5	5
WEST SOUTH CENTRAL												
Arkansas	5	4	4	3,167	45	50	103	153	153	0	2	2
Louisiana	8	3	3	19	51	16	47	288	247	3	3	3
Oklahoma	4	3	3	2,282	34	89	2	402	175	0	2	2
Texas	24	36	36	7,144	906	906	227	2,666	2,457	10	7	16
MOUNTAIN												
Montana	1	2	2	183	4	6	105	45	75	0	0	0
Idaho	0	1	1	184	15	------	6	78	52	0	0	0
Wyoming	0	1	0	16	------	1	12	58	72	0	0	1
Colorado	5	4	6	171	13	21	85	1,091	293	2	0	1
New Mexico	0	0	0	4	3	2	64	11	23	0	0	0
Arizona	4	15	1	196	73	83	47	228	189	0	2	0
Utah [2]	0	0	0	220	8	13	19	522	239	1	1	0
Nevada	0	0	0	------	------	------	------	3	1	0	0	0
PACIFIC												
Washington	4	4	3	52	------	2	53	732	354	1	3	3
Oregon	0	10	2	173	3	16	29	387	156	0	0	1
California	10	17	17	45	41	48	185	3,634	2,920	6	11	11
Total	241	314	219	35,939	1,871	2,148	6,502	38,233	25,377	83	158	191
14 weeks	4,001	5,252	4,234	242,601	177,855	64,484	75,568	260,450	235,785	1,200	2,706	3,423
Seasonal low week [3]	(27th) July 5–11			(30th) July 26–Aug. 1			(35th) Aug. 30–Sept. 5			(37th) Sept. 13–19		
Total since low	11,567	16,896	12,970	275,576	540,103	100,346	98,455	286,574	273,798	2,172	4,210	5,875

[1] New York City only.

[2] Period ended earlier than Saturday.

[3] Dates between which the approximate low week ends. The specific date will vary from year to year.

*Current reports are exclusive of Pennsylvania; report not received.

**Kentucky reported 1,036 cases of influenza for the current week and delayed report of 12,910 cases for week ended March 29. These figures are excluded from totals for comparative purposes. (See previous reports of upper respiratory infections in Kentucky revealed by special surveys).

Telegraphic morbidity reports from State health officers for the week ended Apr. 5, 1947, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46
	Apr. 5, 1947	Apr. 6, 1946		Apr. 5, 1947	Apr. 6, 1946		Apr. 5, 1947	Apr. 6, 1946		Apr. 5, 1947 [4]	Apr. 6, 1946	
NEW ENGLAND												
Maine	0	0	0	19	24	24	0	0	0	0	0	0
New Hampshire	0	1	0	15	27	8	0	0	0	0	0	0
Vermont	0	0	0	7	6	13	0	0	0	0	0	0
Massachusetts	0	0	0	103	184	383	0	0	0	2	1	1
Rhode Island	0	0	0	15	5	21	0	0	0	0	0	0
Connecticut	0	0	0	53	62	82	0	0	0	1	0	1
MIDDLE ATLANTIC												
New York	3	3	2	402	789	667	[5] 0	0	0	2	2	6
New Jersey	0	0	0	130	176	200	0	0	0	1	3	2
Pennsylvania	------	1	1	-------	482	482	-----	0	0	------	3	3
EAST NORTH CENTRAL												
Ohio	0	0	0	381	435	409	2	0	0	2	0	3
Indiana	0	0	0	90	85	108	0	0	0	1	1	1
Illinois	3	2	2	111	177	233	0	0	0	2	0	1
Michigan [2]	1	2	0	140	159	174	0	1	0	1	2	2
Wisconsin	0	0	0	64	130	245	0	0	0	1	0	0
WEST NORTH CENTRAL												
Minnesota	0	0	0	30	42	80	0	0	0	0	0	0
Iowa	0	0	0	41	59	59	0	0	1	0	0	0
Missouri	1	0	0	51	77	80	0	0	1	1	2	1
North Dakota	0	0	0	10	8	23	0	0	0	0	0	0
South Dakota	0	0	0	13	21	21	0	0	0	0	0	0
Nebraska	0	0	0	30	39	53	0	0	0	0	3	0
Kansas	0	1	0	55	80	93	0	0	0	1	1	0
SOUTH ATLANTIC												
Delaware	0	0	0	9	9	9	0	0	0	0	0	0
Maryland [2]	0	0	0	33	174	174	0	0	0	0	0	1
District of Columbia	0	0	0	18	24	26	0	0	0	0	0	0
Virginia	0	0	0	34	97	97	0	0	0	2	2	2
West Virginia	0	0	0	13	27	32	0	0	0	2	0	1
North Carolina	0	1	0	30	47	41	0	0	0	0	0	1
South Carolina	0	0	1	7	5	4	0	0	0	0	0	0
Georgia	1	0	0	10	10	10	0	0	0	1	4	4
Florida	1	2	1	5	5	7	0	0	0	3	1	3
EAST SOUTH CENTRAL												
Kentucky	0	1	1	26	33	48	1	0	0	1	1	1
Tennessee	0	0	0	47	27	35	0	0	0	0	1	1
Alabama	0	1	1	28	3	17	0	0	0	1	2	0
Mississippi [2]	0	0	1	7	4	6	0	0	1	1	1	1
WEST SOUTH CENTRAL												
Arkansas	1	1	0	4	13	7	0	0	0	0	4	0
Louisiana	2	0	0	7	12	9	0	0	0	3	4	3
Oklahoma	0	1	0	2	14	14	0	0	0	0	0	0
Texas	3	2	2	27	43	76	0	0	0	3	8	6
MOUNTAIN												
Montana	0	3	0	7	12	12	0	0	0	0	0	0
Idaho	0	0	0	12	8	38	0	0	0	0	4	0
Wyoming	0	0	0	2	6	15	0	0	0	0	0	0
Colorado	0	2	0	46	27	50	0	1	0	0	2	0
New Mexico	0	0	0	6	6	6	0	0	0	0	0	1
Arizona	1	0	0	6	7	14	0	0	0	0	1	1
Utah [2]	0	0	0	21	20	35	0	0	0	0	0	0
Nevada	0	0	0	1	0	1	0	0	0	0	0	0
PACIFIC												
Washington	0	2	0	26	45	65	0	7	0	0	2	0
Oregon	0	0	0	21	26	30	0	0	0	1	2	2
California	4	2	2	139	180	180	0	4	0	6	4	3
Total	21	28	19	2,354	3,951	4,246	3	13	14	39	61	61
14 weeks	701	546	359	38,223	48,492	55,893	[5] 68	137	174	609	634	781
Seasonal low week [3]	(11th) Mar. 15–21			(32d) Aug. 9–15			(35th) Aug. 30–Sept. 5			(11th) Mar. 15–21		
Total since low	76	80	57	64,909	87,063	94,989	118	213	291	124	159	159

[2] Period ended earlier than Saturday.
[3] Dates between which the approximate low week ends. The specific date will vary from year to year.
[4] Including paratyphoid fever reported separately as follows: Massachusetts 2 (salmonella infection); New York 1; New Jersey 1; Virginia 1; Georgia 1; Louisiana 1; California 3.
[5] Delayed report, smallpox, New York City: March 5–24, 4 cases, 1 death, imported infection. Cases are included in cumulative total.

Telegraphic morbidity reports from State health officers for the week ended Apr. 5, 1947, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Whooping cough			Week ended Apr. 5, 1947							
	Week ended—		Median 1942–46	Dysentery			Encephalitis, infectious	Rocky Mt. spotted fever	Tularemia	Typhus fever, endemic	Undulant fever
	Apr. 5, 1947	Apr. 6, 1946		Amebic	Bacillary	Unspecified					
NEW ENGLAND											
Maine	34	17	17								1
New Hampshire	3	7	5								
Vermont	9	5	24								5
Massachusetts	109	90	148								1
Rhode Island	15	22	22								
Connecticut	74	44	44								
MIDDLE ATLANTIC											
New York	166	163	234	3	2						4
New Jersey	102	155	155	3							1
Pennsylvania		97	169								
EAST NORTH CENTRAL											
Ohio	128	98	143						1		1
Indiana	15	10	10				1				4
Illinois	55	111	111	7	4				2		9
Michigan [2]	189	101	101	1	1						2
Wisconsin	126	97	97								12
WEST NORTH CENTRAL											
Minnesota	6	7	9	1							1
Iowa	6	10	10								7
Missouri	13	17	17								
North Dakota		2	9								
South Dakota	1		1								
Nebraska	12	3	7	1							1
Kansas	9	31	34								11
SOUTH ATLANTIC											
Delaware	2	1	1								
Maryland [2]	58	22	44								2
District of Columbia	5	6	11							1	
Virginia	63	32	48			89					2
West Virginia	25	34	34								
North Carolina	45	74	151							1	1
South Carolina	67	53	55		6				1	1	1
Georgia	13	5	19		1				7	4	2
Florida	51	19	18	1	1				1	2	
EAST SOUTH CENTRAL											
Kentucky	18	16	50								
Tennessee	28	28	36	1						1	1
Alabama	103	15	36	1						2	3
Mississippi [2]	15									1	
WEST SOUTH CENTRAL											
Arkansas	19	8	9			4			1		1
Louisiana	8		3	2					7	1	
Oklahoma	9	10	10								
Texas	418	190	196	5	141	57				3	7
MOUNTAIN											
Montana	2	7	11								
Idaho	13	7									2
Wyoming		1	2								
Colorado	28	29	29		1						1
New Mexico	3	7	7								
Arizona	23	7	29			26					
Utah [2]	9	23	32						1		
Nevada	1										1
PACIFIC											
Washington	56	22	34								4
Oregon	19	16	19								1
California	176	54	286	2	1						4
Total	2,349	1,779	2,435	28	158	176	1	0	21	17	93
Same week, 1946	1,779			34	324	69	6	0	10	45	89
Median, 1942–46	2,435			22	221	50	6	0	10	42	[5] 87
14 weeks: 1947	35,487			655	4,425	3,025	93	12	494	578	1,465
1946	25,398			517	3,991	1,455	112	6	277	654	1,061
Median, 1942–46	34,076			44	2,810	896	112	4	256	654	[5] 1,128

[2] Period ended earlier than Saturday.
[5] 2-year average, 1945–46

Anthrax: New York 1.
Leprosy: Texas 1, California 1.

WEEKLY REPORTS FROM CITIES [1]

City reports for week ended Mar. 29, 1947

This table lists the reports from 85 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0		0	33	0	0	0	0	0	0	6
New Hampshire:												
Concord	0	0		0		0	0	0	0	0	0	
Vermont:												
Barre	0	0		0	16	0	0	0	0	0	0	
Massachusetts:												
Boston	8	0		0	67	0	12	0	23	0	0	18
Fall River	0	0		0	2	0	0	0	1	0	0	3
Springfield	0	0		0	11	0	2	0	5	0	1	1
Worcester	0	0		0	6	0	8	0	8	0	0	15
Rhode Island:												
Providence	0	0		1	115	0	3	0	7	0	0	3
Connecticut:												
Bridgeport	0	0		0	24	0	0	0	5	0	0	4
Hartford	1	0		0	46	0	3	0	1	0	0	
New Haven	0	0		0	43	0	0	0	12	0	0	2
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0		1	2	0	11	0	13	0	0	2
New York	16	1	9	3	195	1	79	1	170	[2] 0	1	37
Rochester	0	0		1	3	0	8	0	10	0	0	
Syracuse	0	0		1		0	4	0	13	0	0	14
New Jersey:												
Camden	1	0		0	1	0	0	0	6	0	0	4
Newark	0	0		0	14	0	5	0	22	0	0	24
Trenton	0	0	4	0	20	0	2	0	1	0	0	1
Pennsylvania:												
Philadelphia	4	0	4	1	24	2	23	0	49	0	0	54
Pittsburgh	3	0	4	0	16	0	15	0	33	0	0	8
Reading	0	0		1	1	0	2	0	3	0	0	2
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	0	0	2	6		3	6	0	11	0	0	5
Cleveland	0	0	74	1	266	1	24	0	88	0	0	37
Columbus	5	0	1	1	12	1	4	0	12	0	0	16
Indiana:												
Fort Wayne	0	0		0	37	0	4	0	4	0	0	
Indianapolis	0		1	2	3	1	18	0	21	0	0	10
South Bend	0	0		0	2	0	0	0	2	0	0	
Terre Haute	0	0		0		0	5	0	0	0	0	
Illinois:												
Chicago	1	0	19	1	16	5	57	1	37	0	0	30
Michigan:												
Detroit	2	1	7	6	7	4	27	1	48	0	0	70
Flint	0	0		0	0	0	7	0	7	0	0	4
Grand Rapids	0	0		0	2	0	4	0	4	0	0	4
Wisconsin:												
Kenosha	0	0		0		0	0	0	0	0	0	
Milwaukee	8	0	6	5	10	0	15	1	12	0	0	22
Racine	0	0		0		0	2	0	2	0	0	10
Superior	0	0		0		0	0	0	1	0	0	2
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0		1		0	2	0	0	0	0	1
St. Paul	1	0		1	9	0	7	0	8	0	0	
Missouri:												
Kansas City	0	0	10	1		1	14	0	21	0	2	2
St. Joseph	0	0		0		0	0	0	0	0	0	1
St. Louis	0	0	12	4	3	1	27	0	8	0	0	12

[1] In some instances the figures include nonresident cases.
[2] Delayed report, smallpox, New York City: March 5–24, 4 cases, 1 death, imported infection.

City reports for week ended Mar. 29, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
WEST NORTH CENTRAL—continued												
Nebraska:												
Omaha	0	0		0		0	3	0	2	0	0	
Kansas:												
Topeka	0	0	8	0	1	0	1	0	9	0	0	
Wichita	0	0		0	2	0	8	0	1	0	0	2
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0		0	1	0	3	0	6	0	0	2
Maryland:												
Baltimore	5	0	11	4	8	0	13	0	9	0	0	39
Cumberland	0	0		0		0	1	0	0	0	0	
Frederick	0	0		0		0	0	0	1	0	0	
District of Columbia:												
Washington	0	0	4	0	31	1	13	0	14	0	2	6
Virginia:												
Lynchburg	0	0		1		0	3	0	1	0	0	
Richmond	0	0	1	1	76	0	4	0	4	0	0	1
Roanoke	0	0		0	3	0	0	0	3	0	0	
West Virginia:												
Wheeling	0	0	26	0	3	0	5	0	1	0	0	
North Carolina:												
Raleigh	0	0		0	1	0	1	0	0	0	0	10
Wilmington	0	0		0	32	0	0	0	0	0	0	
Winston-Salem	0	0		0	14	0	0	0	0	0	0	
South Carolina:												
Charleston	0	0	17	1	11	0	2	0	1	0	0	
Georgia:												
Atlanta	0	0	15	0	9	0	5	0	4	0	0	1
Brunswick	0	0		0		0	0	0	0	0	0	
Florida:												
Tampa	1	0	12	0	3	0	0	0	2	0	0	3
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	0	0		0	1	0	9	0	1	0	0	5
Nashville	2	0		2	1	0	2	0	7	0	0	7
Alabama:												
Birmingham	1	0	39	1	44	0	5	0	2	0	0	2
Mobile	0	0	22	0	15	0	2	0	7	0	0	1
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	196	0		0	1	0	0	0	0	3
Louisiana:												
New Orleans	9	0	17	1	54	0	5	1	6	0	1	3
Shreveport	0	0		1		0	8	0	2	0	0	
Oklahoma:												
Oklahoma City	0		435	0	2	0	4	0	1	0	0	3
Texas:												
Dallas	4	0	7	7	25	0	4	0	4	0	0	11
Galveston	0	0		0		0	0	0	0	0	0	
Houston	0	0	6	1	1	0	7	0	4	0	0	4
San Antonio	2	0	10	2	5	0	4	0	0	0	0	3
MOUNTAIN												
Montana:												
Billings	0	0		0	1	0	2	0	0	0	0	
Great Falls	0	0		0	74	0	0	0	0	0	0	
Helena	0	0		0		0	0	0	0	0	0	
Missoula	0	0	352	0	3	0	0	0	0	0	0	
Colorado:												
Denver	2	0	4	0	31	0	3	0	18	0	0	6
Pueblo	0	0		0		0	1	0	3	0	0	
Utah:												
Salt Lake City	2	0	1	0	4	0	1	0	3	0	0	3

City reports for week ended Mar. 29, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
PACIFIC												
Washington:												
Seattle	1	0		0	4	0	8	0	6	0	3	1
Spokane	0	0		0	19	0	3	0	0	0	0	1
Tacoma	0	0		0	2	0	0	0	1	0	0	
California:												
Los Angeles	1	0	3	0	7	1	2	1	40	0	0	6
Sacramento	0	0		0	1	0	2	0	0	0	0	6
San Francisco	0	0		0	13	0	10	0	9	0	2	3
Total	72	2	1,339	60	1,518	22	545	6	790	0	12	556
Corresponding week, 1946*	96		78	17	13,386		358		1,388	6	15	534
Average 1942-46*	69		104	[3] 27	[4] 6,973		[3] 401		1,709	1	12	723

[3] 3-year average, 1944-46.
[4] 5-year median, 1942-46.

*Exclusive of Oklahoma City.
Anthrax.—Cases: Philadelphia 1.
Dysentery, amebic.—Cases: New York 9; St. Paul 1; Oklahoma City 1; Los Angeles 2.
Dysentery, bacillary.—Cases: Worcester 1; Buffalo 1; Detroit 1; Los Angeles 1.
Dysentery, unspecified.—Cases: San Antonio 6.
Leprosy.—Cases: New Orleans 1.
Tularemia.—Cases: New Orleans 1.
Typhus fever, endemic.—Cases: New York 1; Mobile 2; New Orleans 1; Houston 1.

Rates (annual basis) per 100,000 population, by geographic groups, for the 85 cities in the preceding table (latest available estimated population, 33,829,600)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza Case rates	Influenza Death rates	Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
New England	23.5	0.0	0.0	2.6	949	0.0	73.2	0.0	162	0.0	2.6	136
Middle Atlantic	11.1	0.5	9.7	3.7	128	1.4	69.0	0.5	148	0.0	0.5	68
East North Central	4.9	0.6	67.5	13.5	218	9.2	106.0	1.8	122	0.0	0.0	129
West North Central	2.5	0.0	73.9	17.3	37	4.9	152.8	0.0	121	0.0	4.9	44
South Atlantic	10.5	0.0	149.8	12.2	334	1.7	87.1	0.0	80	0.0	3.5	108
East South Central	17.7	0.0	360.0	17.7	360	0.0	106.2	0.0	100	0.0	0.0	89
West South Central	38.1	0.0	1,704.4	30.5	246	0.0	83.8	2.5	43	0.0	2.5	69
Mountain	33.0	0.0	2,948.8	0.0	933	0.0	57.8	0.0	198	0.0	0.0	74
Pacific	3.2	0.0	4.7	0.0	73	1.6	39.5	1.6	89	0.0	7.9	27
Total	11.1	0.3	207.0	9.3	235	3.4	84.2	0.9	122	0.0	1.9	86

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended March 15, 1947.—During the week ended March 15, 1947, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		30		240	325	13	15	76	113	812
Diphtheria		4	1	9	2	1			1	18
Dysentery, amebic					4					4
Encephalitis, infectious						1				1
German measles		11		40	70	1	6	7	4	139
Influenza		122			23	3			34	182
Measles		112		62	83	468	79	153	473	1,430
Meningitis, meningococcus		1	1					1		3
Mumps		7		95	635	73	184	50	224	1,268
Poliomyelitis				1						1
Scarlet fever		7	3	58	92		1	5	10	176
Tuberculosis (all forms)		8	10	141	17	23	5	23	41	268
Typhoid and paratyphoid fever		1	2	6	1		1	1		12
Undulant fever				1	2			2		5
Venereal diseases:										
Gonorrhea	2	13	16	121	103	37	21	38	74	425
Syphilis		12	8	109	85	7	6	11	40	278
Other forms									2	2
Whooping cough		2	3	20	49	17		5	42	138

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From consular reports, international health organizations, medical officers of the Public Health Service, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

[C indicates cases]

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place		January-December 1946	January-February 1947	March 1947—week ended— 1	8	15	22	29
ASIA								
Afghanistan	C	35						
Burma	C	1,543	80		2	2		
Bassein	C	29						
Moulmein	C	201	2		2	2		
Rangoon	C	23						
Ceylon	C	110						
China:								
Anhwei Province	C	2,749						
Chekiang Province	C	4,680						
Formosa, Island of	C	3,432						
Fukien Province	C	1,568						
Foochow	C	712						
Honan Province	C	2,102						
Hopeh Province	C	397						

CHOLERA—Continued

Place		January-December 1946	January-February 1947	March 1947—week ended— 1	8	15	22	29
China—Continued								
Hunan Province	C	2,046						
Hupeh Province	C	363						
Ichang Province	C	147						
Kiangsi Province	C	1,594						
Kiangsu Province	C	[1] 9,752						
Shanghai	C	[1] 4,583						
Kwangsi Province	C	1,011						
Kwangtung Province	C	5,005						
Canton	C	2,002						
Hong Kong	C	505						
Kweichow Province	C	8						
Macao, Island of	C	2						
Shantung Province	C	225						
Szechwan Province	C	162						
Yunnan Province	C	17						
India	C	72,740	5,988					
Bombay	C	[2] 2						
Calcutta	C	1,925	341	40	77	139	109	
Cawnpore	C	45			1	2	3	
Chittagong	C	8			[2] 1			
Madras	C	5	2					
India (French)	C	4	30					
Indochina (French):								
Cambodia	C	508	230					
Cochinchina	C	911	64					
Bien Hoa	C	24						
Chaudok	C	21						
Giadinh	C		11					
Longxuyen	C		6					
Mytho	C	144						
Rachgia	C	1	9					
Saigon-Cholon	C	88	34	9	7	11	17	
Vinh-long	C	16	4					
Laos	C	49						
Japan	C	1,229						
Korea (Chosen)	C	[3] 11,351						
Malay States	C	245						
Manchuria	C	18,554						
Mongolia	C	18						
Siam (Thailand)	C	4,379	991	89				
Bangkok	C	584	246	9		12	21	
Straits Settlements: Singapore	C	[2] 1						

[1] Includes imported cases.
[2] Imported.
[3] From the beginning of the outbreak in April or May to approximately Sept. 1, 1946.

PLAGUE

[C indicates cases; D, deaths; P, present]

Place		January-December 1946	January-February 1947	March 1947—week ended— 1	8	15	22	29
AFRICA								
Algeria	C	2						
Bechuanaland	C	21						
Belgian Congo	C	[1] 35			[2] 4	P		
British East Africa:								
Kenya	C	38	6	2				
Uganda	C	12		1				
Egypt	C	217						
Alexandria	C	126						
Ismailiya	C	27						
Matariya	C	12						
Port Said	C	19						
Suez	C	32						
Libya: Tripolitania—Plague infected rats		1						
Madagascar	C	282	101					
Union of South Africa	C	7	9		7	1		
ASIA								
Burma	C	1,703	812	115	59			
Bassein	C	23	[3] 1		[3] 1			
Mandalay	C	1	15	2				
Rangoon	C	154	2	1		1		

For footnotes, see page 624.

PLAGUE—Continued

Place		January-December 1946	January-February 1947	March 1947—week ended—				
				1	8	15	22	29
ASIA—continued								
China:								
Chekiang Province	C	738	1					
Formosa, Island of	C	11						
Fukien Province	C	4,458	21					
Amoy	C	307						
Foochow	C	1,403						
Kiangsi Province	C	338						
Kiangsu Province: Shanghai	C		28					
Kwangtung Province	C	415						
Yunnan Province	C	352	6					
India	C	21,705	19,161					
Indochina (French):								
Annam	C	4	3					
Cochinchina	C	48	2					1
Java	D	[4] 2,409	20	1	5		1	
Manchuria	C	[5] 316						
Palestine	C	17	1					
Siam (Thailand)	C	41	13	4				
Turkey: Akcakale	C					3		
EUROPE								
Great Britain: Malta, Island of	C	6						
Portugal: Azores	C	[6] 23	1					
Turkey (see Turkey in Asia).								
NORTH AMERICA								
Canada.[7]								
SOUTH AMERICA								
Argentina:								
Buenos Aires	C	8						
Cordoba Province	C	1						
Santa Fe Province	C		2					
Bolivia:								
Chuquisaca Department	C	1						
Santa Cruz Department	C	12						
Tarija Department—Plague-infected rats		P						
Brazil:								
Alagoas State	C	2						
Bahia State	C	36						
Ceara State	C	152						
Minas Geraes State	C	12						
Parahyba State	C	19						
Pernambuco State	C	47						
Sergipe State	C	1						
Ecuador:								
Chimborazo Province	C	7	1					
Loja Province	C	38						
Peru:								
Lambayeque Department	C	15						
Libertad Department	C	8	4					
Lima Department	C	29						
Piura Department	C	67	36					
Tumbes Department	C	1						
Plague-infected rats		P						
Venezuela	C	1						
OCEANIA								
Hawaii Territory:[8] Plague-infected rats		7						

1 Includes 16 cases of pneumonic plague.
2 Pneumonic plague.
3 Imported.
4 Unofficially reported.
5 Includes 52 cases of pneumonic plague.
6 Includes 2 cases of pneumonic plague.
7 The imported suspected case previously reported has not been confirmed. Under date of Sept. 14, 1946, plague infection was reported in a pool of fleas from squirrels in Alsask and in a pool of fleas from squirrels in Superb, Saskatchewan, Canada.
8 Plague infection was also proved in Hawaii Territory as follows: On Feb. 5, 1946, in a pool of 29 rats; on Apr. 13, 1946, in a pool of 54 fleas and 15 lice recovered from 7 rats and 22 mice; under date of July 3, 1946, in a pool of 50 fleas recovered from 7 rats and 46 mice, and in a pool of 51 fleas recovered from 10 rats; under date of July 17, 1946, in a pool of 48 fleas recovered from 22 rats, and in a pool of 56 fleas recovered from 33 rats; under date of Sept. 12, 1946, in a pool of 48 fleas recovered from 22 rodents; under date of Oct. 9, 1946, in a pool of 36 rats found on Sept. 10, 1946; on Jan. 9, 1947, in a pool of 31 rats.

SMALLPOX

[C indicates cases; P, present]

Place		January–December 1946	January–February 1947	March 1947—week ended—				
				1	8	15	22	29
AFRICA								
Algeria	C	393	44					
Angola	C	184						
Basutoland	C	46						
Bechuanaland	C	14	4					
Belgian Congo	C	[1] 3,483	[1] 148	[1] 11	[1] 16	[1] 46		
British East Africa:								
Kenya	C	893	80	17	17	1		
Nyasaland	C	745	232	50	34	28		
Tanganyika	C	7,332	397					
Uganda	C	574	65	6				
Cameroon (French)	C	96	7		1			
Dahomey	C	1,591	29					
Egypt	C	405	79	40				
Eritrea	C	[1] 23						
French Equatorial Africa	C	163	3					
French Guinea	C	940	70					
French West Africa: Dakar District	C	40						
Gambia	C	7						
Gold Coast	C	1,552	364	39				
Ivory Coast	C	1,651	437					
Liberia	C	237	23					
Libya	C	923	568	95				
Madagascar	C	1						
Mauritania	C	1	22					
Morocco (French)	C	1,890	38		2			
Morocco (Int. Zone)	C	181	1					
Morocco (Spanish)	C	8	1					
Mozambique	C	4						
Nigeria	C	7,345	403					
Niger Territory	C	563	449					
Rhodesia:								
Northern	C	436	4	1				
Southern	C	148	2	1				
Senegal	C	95	6					
Sierra Leone	C	500	21					
Somaliland (Italian)	C	1						
Sudan (Anglo-Egyptian)	C	56	[1] 16		2		8	
Sudan (French)	C	2,041	156					
Swaziland	C	4	10					
Togo (French)	C	361	59		3			
Tunisia	C	565	211					
Union of South Africa	C	733	P	P	P	P		
ASIA								
Arabia	C	4						
Burma	C	1,981	685	170	198			
Ceylon	C	546	1					
China	C	2,687	707	73	40	111	90	
India	C	60,453	7,394					
India (French)	C	3						
India (Portuguese)	C	19	1					
Indochina (French)	C	2,377	373	37				
Iran	C	40	3					
Iraq	C	22	1	2			3	
Japan	C	17,800	116	10	14			
Malay States	C	2,973	1,640	206	96			
Manchuria	C	96	1					
Palestine	C	[2] 2						
Rhodes, Island of	C	[2] 1						
Siam (Thailand)	C	17,775	398	52				
Straits Settlements	C	204	78	8	3	1	1	
Syria and Lebanon	C	9			1			
Turkey (see Turkey in Europe).								
EUROPE								
Czechoslovakia	C	24						
France	C	16	12		5	6	2	6
Germany	C	1	3					
Gibraltar	C	[2] 3						
Great Britain:								
England and Wales	C	[3] 53	10	9	5			
Malta, Island of	C	10						
Scotland	C	2						

[1] Includes alastrim. [2] Imported. [3] Includes imported cases.

SMALLPOX—Continued

Place		January–December 1946	January–February 1947	March 1947—week ended— 1	8	15	22	29
EUROPE—continued								
Greece	C	114						
Italy	C	654	29					
Portugal	C	61	6	1				
Spain	C	9	13					
Turkey	C	17	1					
Yugoslavia	C	1						
NORTH AMERICA								
Canada	C	2						
Guatemala	C	56						
Honduras	C	4						
Mexico	C	397	18	16				
Nicaragua	C	3						
SOUTH AMERICA								
Argentina	C	69	2					
Bolivia	C	918						
Brazil	C	[1] 678	[1] 16					
Colombia	C	1,071	340					
Ecuador	C	120	34					
Paraguay	C	397	82					
Peru	C	536	34					
Uruguay	C	52	[1] 149					
Venezuela	C	[1] 1,771	[1] 206					
OCEANIA								
Hawaii Territory	C	[4] 1						

[1] Includes alastrim.
[4] Off-shipping.

TYPHUS FEVER*

[C indicates cases; P, present]

AFRICA								
Algeria	C	843	15					
Basutoland	C	11	3					
Belgian Congo [1]	C	2,570	74	8	7	15		
British East Africa:								
Kenya	C	26	2					
Uganda	C	1	1					
Egypt	C	1,525	23	2	1			
Eritrea	C	1,407	168	65				
French West Africa: Dakar District	C	7						
Gold Coast	C	1						
Libya	C	88	7					
Madagascar [3]	C	1						
Morocco (French)	C	3,795	61		5			
Morocco (Int. Zone)	C	59						
Morocco (Spanish)	C	38						
Nigeria	C	53						
Rhodesia, Northern	C	2						
Sierra Leone [1]	C	6						
Tunisia [1]	C	340	40					
Union of South Africa [1]	C	568	P		P	P		
ASIA								
Arabia [1]	C	2						
Burma [1]	C	4	2	1				
China [1]	C	395	15					
India	C	303	5					
Indochina (French)	C	70						
Iran	C	151	3			1		
Iraq	C	219	24	7	3	9	7	
Japan	C	31,141	395	27	18			
Malay States	C	3	7					
Manchuria	C	718						
Palestine [1]	C	121	6					
Philippine Islands [1]	C	4						
Straits Settlements	C	3	1					
Syria and Lebanon	C	86	4					
Trans-Jordan	C	21	1		1	1	1	
Turkey. (See Turkey in Europe.)								

*Reports from some areas are probably murine type, while others probably include both murine and louse-borne types.

For footnotes, see page 627.

TYPHUS FEVER—Continued

Place		January-December 1946	January-February 1947	March 1947—week ended—				
				1	8	15	22	29
EUROPE								
Albania	C	140						
Austria	C	35	1					
Belgium [1]	C	14						
Bulgaria	C	1,120	258	25				
Czechoslovakia [1]	C	799	3	1				
France [1]	C	16	3					
Germany	C	1,873	4					
Gibraltar [2]	C	1						
Great Britain:								
England and Wales	C	1						
Malta and Gozo [1]	C	32	3					
Greece [1]	C	631	48	5	3	4	4	
Hungary	C	1,115	169	16	21	38		
Italy	C	92	2					
Netherlands [1]	C	29	1					
Poland	C	3,430	103					
Portugal	C	14	1					
Rumania	C	8,735	1,785					
Spain	C	28	10					
Canary Islands	C	2						
Sweden [2]	C	1						
Switzerland [1]	C	2	1					
Turkey	C	1,412	207	28	18	19	15	
Union of Soviet Socialist Republics:								
Ukraine	C	P						
Yugoslavia	C	3,079						
NORTH AMERICA								
Costa Rica [2]	C	123	15	3	2		5	
Cuba [2]	C	18	1					
Guatemala	C	779	49					
Jamaica [2]	C	41	2	4	1			
Mexico	C	1,928	235					
Nicaragua [2]	C	1						
Panama Canal Zone	C	1						
Panama (Republic)	C	4	12					
Puerto Rico [2]	C	105	7					
Salvador	C	1						
Virgin Islands [2]	C	3						
SOUTH AMERICA								
Argentina	C	7	4					
Bolivia	C	251						
Brazil [1]	C	17						
Chile	C	561	79	7	3	14	1	
Colombia	C	973	205					
Curacao [2]	C	1						
Ecuador [1]	C	1,096	112					
Paraguay	C	7						
Peru	C	1,123	82					
Venezuela [1]	C	112	10					
OCEANIA								
Australia [2]	C	153	19	2	1	2		
Hawaii Territory [2]	C	89	9					

[1] Includes cases of murine type.
[2] Murine type.

YELLOW FEVER

[C indicates cases; D, deaths]

Place		January-December 1947	January-February 1947	March 1947—week ended— 1	8	15	32	28
AFRICA								
French Equatorial Africa: Carnot	C	[1] 8						
Ivory Coast: Seguela	C	1						
Nigeria:								
Ibadan	C	1						
Ilorin	C	1						
Kafanchan	C	2						
Ogbomosho	C	42						
Sierra Leone: Pujehan	C	1						
SOUTH AMERICA								
Bolivia: Santa Cruz Department	D	[2] 40						
Brazil: Para State	D	1						
Colombia:								
Antioquia Department	C	1				[3] 3		
Caldas Department	D		1					
Caqueta Territory	D	2						
Cundinamarca Department	D		2					
Magdalena Department	D	1						
Santander Department	D	17	18					
Tolima Department	D		2					
Peru: San Martin Department	D	3						
Venezuela:								
Tachira State	C	4						
Trujillo State	C	4						
Zulia State	C	4						

[1] Includes 3 suspected cases.
[2] Diagnosis confirmed in 14 cases and 10 deaths.
[3] For the period Mar. 1-14, 1947.

DEATHS DURING WEEK ENDED MAR. 29, 1947

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Mar. 29, 1947	Corresponding week 1946
Data for 93 large cities of the United States:		
Total deaths	10,820	9,461
Median for 3 prior years	9,461	
Total deaths, first 13 weeks of year	131,465	132,576
Deaths under 1 year of age	828	634
Median for 3 prior years	634	
Deaths under 1 year of age, first 13 weeks of year	10,559	7,878
Data from industrial insurance companies:		
Policies in force	67,328,480	67,191,152
Number of death claims	15,305	13,568
Death claims per 1,000 policies in force, annual rate	11.9	10.5
Death claims per 1,000 policies, first 13 weeks of year, annual rate	10.0	11.3

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United States Public Health Service

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DIVISION OF PUBLIC HEALTH METHODS

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TUBERCULOSIS CONTROL ISSUE NO. 15

IN THIS ISSUE

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Public Health Reports

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EDITORIAL

MASS RADIOGRAPHY IN GENERAL HOSPITALS

Today, many hospitals throughout the Nation are participating in the greatest effort ever undertaken to eradicate tuberculosis from the population. Hospital administrators have been aware for many years of the grievous hazard of tuberculosis to the operating personnel of their institutions and have employed a variety of techniques to prevent contagion. However, the furtive ubiquity of the disease, its concealment in the chests of patients admitted to the wards for reasons other than tuberculosis, make possible the spread of tubercle bacilli even to the wary. In addition, the alert administrator knows that his institution can serve as the chief instrument in many of the aspects of public health control of tuberculosis.

Sixteen million people are admitted to general hospitals every year. These people constitute the largest single source of those adults among whom disease is most prevalent. They offer the hospital staff the opportunity to protect the community against spreaders of tuberculosis and the chance to save the lives of many who, if allowed to continue without treatment, would advance too far into disease to be saved.

In former years, mass case finding in general hospitals was not practicable because speedy and inexpensive X-ray equipment was not available. Until 5 years ago, all chest plates were 14 × 17 conventional diagnostic films. The advent of the photofluorograph, automatic phototimer, and fine-grain roll film made possible the X-ray examination of as many as 500 persons in an 8-hour day at slight cost and with a minimum expenditure of time and energy.

This is the fifteenth of a series of special issues of PUBLIC HEALTH REPORTS devoted exclusively to tuberculosis control, which will appear the first week of each month. The series began with the Mar. 1, 1946 issue. The articles in these special issues are reprinted as extracts from the PUBLIC HEALTH REPORTS. Effective with the July 5, 1946 issue, these extracts may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., for 10 cents a single copy. Subscriptions are obtainable at $1.00 per year; $1.25 foreign.

With photofluorographic equipment installed near the hospital admission office, incoming patients can easily be X-rayed before assignment to ward or room. Such a procedure will produce X-ray evidence of serious pulmonary disease in 1 to 3 percent of all patients. Tuberculosis in all stages of advancement will be found, for the most part, among persons 20 to 45 years of age. These persons constitute the most effective economic group in the community. Discovering and treating tuberculosis in this age group will be of untold value to the community. Most importantly, the disease will be minimal in the great majority of cases discovered, and these cases, given prompt attention, health instruction, and follow-up examinations, will return to sound health and economic productivity within a relatively short period of time.

In addition to case-finding, which perhaps, is the most important function of the general hospital in the control of tuberculosis, medical care and isolation can be provided, in many communities, by tuberculosis wards or wings. The current shortage of more than 50,000 beds for the tuberculous will become a less serious problem in treating the diseased and separating the infectious from the public if general hospitals provide beds for local citizens who do not require the specialized services of a tuberculosis hospital. Small sanatoria would be less pressed for service and would have opportunity to admit serious cases in need of immediate and prolonged attention.

The hospital laboratory, the X-ray department, and the services of expert consultants can be utilized effectively in the diagnosis of doubtful cases requiring careful study. Questionable asymptomatic cases can be supervised in the out-patient department until the presence or absence of active disease is determined. Persons who require pneumothorax may be hospitalized for a preliminary period of three to four weeks, and then, if there are no sanatorium or hospital beds for the tuberculous, they may be followed up as ambulatory cases. In many institutions, even advanced infectious cases may be given chest surgery and cared for until the local sanatorium is in a position to assume responsibility.

Indeed, the general hospital is in a unique position in tuberculosis control. Institutions in large cities, especially, can participate actively in such necessary contingent aspects of control as rehabilitation and the social and economic problems posed by this family and community disease. For highest effectiveness, hospital services for the tuberculous should be integreated with the public health programs in the city, town, or county. In every institution, the general practitioner must be an active participant in the radiography program. He provides the hospital with its patients, makes the final diagnosis, and treats those persons who are singled out by routine chest X-ray.

The various interested agencies and private physicians can then bring together their knowledge and techniques, in a total assault on a disease that can be forced to continue its retreat into oblivion.

HERMAN E. HILLEBOE,
Assistant Surgeon General,
Associate Chief, Bureau of State Services.

STUDIES OF FUNGUS ANTIGENS [1]

I. QUANTITATIVE STUDIES OF CROSS-REACTIONS BETWEEN HISTOPLASMIN AND BLASTOMYCIN IN GUINEA PIGS

By ARDEN HOWELL, Jr., Ph. D., *Senior Mycologist, United States Public Health Service*

INTRODUCTION

The specificity of the histoplasmin reaction in man has become of great importance since the demonstration by Palmer (*1*) and Christie and Peterson (*2*) of a high degree of correlation between pulmonary calcification and sensitivity to histoplasmin in individuals who do not react to tuberculin. Emmons, Olson, and Eldridge (*3*) have reported cross-reactions between histoplasmin, blastomycin, coccidioidin, and haplosporangin in animals experimentally infected with the fungi from which these antigens were produced; in particular, nearly complete cross-reactions between histoplasmin and blastomycin. This paper reports further studies on the specificity of histoplasmin and blastomycin in animals with experimental histoplasmosis and blastomycosis.

The present paper is one of a series reporting the results of the extensive studies of histoplasmin sensitivity being conducted in Kansas City, Mo., where early in 1945 special facilities were established for research on histoplasmin sensitivity in both human beings and animals.

MATERIALS AND METHODS

Six strains of *Histoplasma capsulatum* and five of *Blastomyces dermatitidis* were used in these studies. One strain of *Histoplasma* was obtained from the American Type Culture Collection, designated by them as culture No. 8136. A second strain, isolated by Dr. James Owens at Vanderbilt University Hospital in 1943,[2] was furnished by Dr. J. C. Peterson of Vanderbilt University School of Medicine. The four additional strains of *Histoplasma* and the five strains of *Blastomyces* were obtained through the courtesy of Dr. Norman F. Conant, Duke University Medical School. These four strains of *Histoplasma*

[1] From the Field Studies Section, Tuberculosis Control Division, Bureau of State Services.
[2] Personal communications to the author.

were isolated from cases reported by Rhodes et al. (*4*), de Monbreun (*5*), Reid et al. (*6*), and Dr. B. C. Portuondo,[2] St. Louis, Mo. The five strains of *Blastomyces* were isolated from cases of blastomycosis observed at Duke University Hospital in 1945.

The histoplasmin and blastomycin used in these studies were prepared by a method similar to that used by Emmons et al. (*3*). Cultures were grown from 80 to 201 days on Long's synthetic medium to which 1 percent bacto dextrose had been added, or on the synthetic medium used by Emmons et al. (*3*). Three lots of histoplasmin and five lots of blastomycin were employed. These were designated as lots H–1, H–15, H–6, B–1, B–2, B–3, B–7, and B–11, respectively.

In addition to the several lots of histoplasmin and blastomycin, a heat-killed antigen was prepared from the yeast phase of both *Histoplasma* and *Blastomyces* for comparative purposes. In preparing these antigens, yeast-phase cultures of *Histoplasma* were grown for 5 days on blood-agar slants which were sealed with paraffin and incubated at 37° C., as described by Conant (*7*). Yeast-phase cultures of *Blastomyces* were grown for 7 days on brain-heart infusion agar and incubated at 37° C., as described by Conant and Howell (*8*). In both instances, the growth was washed from the slants with sterile saline, made up 1:10 by volume, and inactivated for four hours at 56° C., as recommended by Martin and Smith (*9*) for *Blastomyces dermatitidis*. Repeated injections of 0.1 cc. of a 1:100 dilution of these antigens into control guinea pigs showed that these antigens, in this dilution, do not sensitize these animals.

Each guinea pig used in this study was tested by the intradermal injection of 0.1 cc. of a 1:100 dilution, respectively, of histoplasmin, blastomycin, and the two heat-killed antigens (described above). None of these normal animals reacted to any of these antigens in this dilution. The guinea pigs were then experimentally infected by intraperitoneal inoculation of graded doses of a saline suspension of the yeast phase of *Histoplasma capsulatum* or of a similar pooled suspension of the yeast phase of five strains of *Blastomyces dermatitidis*.

Four to six weeks after inoculation, the animals were tested with several dilutions of each lot of histoplasmin and blastomycin and with the heat-killed yeast-phase antigens. One-tenth milliliter of each dilution of each lot was injected into each animal intradermally, and the reactions were read after both 24 and 48 hours. As reported by Emmons (*3*), reactions to histoplasmin and blastomycin in infected guinea pigs reach their height at 24 hours, and may disappear within 48 hours. It was observed in this work that reactions to the heat-killed yeast-phase suspensions may reach their peak within 24 hours but usually persist for 48 hours or longer. Only those animals

[2] Personal communications to the author.

that exhibited areas of induration of five or more millimeters in diameter were considered reactors.

I. *Titration of antigens on experimentally infected animals*

Filtrate antigens.—Forty-seven guinea pigs infected with *Histoplasma capsulatum* and thirty-seven infected with *Blastomyces dermatitidis* were tested with various dilutions of various lots of histoplasmin and blastomycin. The results of these tests are summarized in tables 1 and 2 and figures 1 and 2.

TABLE 1.—*Results of testing with various dilutions of specified lots of histoplasmin in guinea pigs experimentally infected with* Histoplasma capsulatum

Item	Lot H-6 (dilution)			Lot H-15 (dilution)				Lot H-1 (dilution)	
	1:1,000	1:2,000	1:5,000	1:100	1:1,000	1:2,000	1:5,000	1:100	1:1,000
Number of animals tested	40	40	40	47	47	40	40	47	47
Number of reactors	39	39	32	47	42	13	1	43	2
Percentage of reactors	97.5	97.5	80.0	100.0	89.4	32.5	2.5	91.5	4.3
Average diameter of reaction [1]	8.8	7.1	6.3	[2] 9.0	9.7	6.7	5.0	8.8	6.0

[1] Induration in millimeters.
[2] Based on measurement of test on 5 animals.

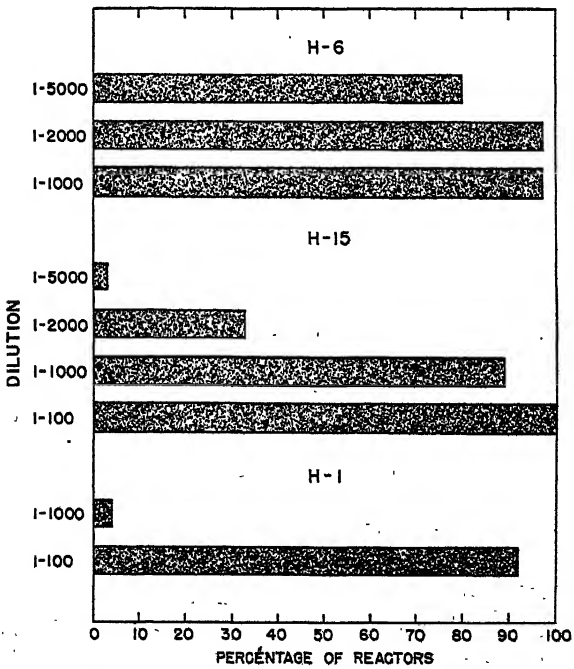

FIGURE 1.—Titration of specified lots of histoplasmin on guinea pigs experimentally infected with *H. capsulatum.*

It can readily be seen, from the data presented in table 1 and figure 1, that 39 of 40 or 97.5 percent of the animals infected with *Histoplasma* reacted to a 1:1,000 dilution of histoplasmin, lot H–6, whereas 42 of 47 or 89.4 percent reacted to a 1:1,000 dilution of H–15, and only 2 of 47 or 4.3 percent reacted to the same dilution of lot H–1. However, if the concentration of lot H–1 were increased to a 1:100 diultion, then 43 of 47 or 91.5 percent reacted.

TABLE 2.—*Results of testing with various dilutions of specified lots of blastomycin in guinea pigs experimentally infected with* Blastomyces dermatitidis

Item	Lot B–11 (dilution)			Lot B–7 (dilution)			Lot B–3 (dilution)			Lot B–2 (dilution)				Lot B–1 (dilution)		
	1:1,000	1:2,000	1:5,000	1:1,000	1:2,000	1:5,000	1:1,000	1:2,000	1:5,000	1:100	1:1,000	1:2,000	1:5,000	1:100	1:1,000	1:2,000
Number of animals tested	33	33	33	33	33	33	33	33	33	37	34	28	34	36	37	37
Number of reactors	2	0	0	29	26	14	9	2	0	31	27	10	3	27	4	4
Percentage of reactors	6.1	0	0	87.9	78.8	42.4	27.3	6.1	0	83.8	79.4	35.7	8.8	75.0	10.8	10.8
Average diameter of reaction [1]	5.5	-----	-----	9.0	7.9	6.4	5.5	6.0	-----	[2] 6.9	7.4	6.5	6.0	7.9	7.0	8.2

[1] Induration in millimeter.
[2] Based on measurement of only 10 animals.

Similar results were obtained with different lots of blastomycin tested on animals infected with *Blastomyces*. For example, 29 of 33 or 87.9 percent of the animals tested reacted to a 1:1,000 dilution of blastomycin, lot B–7; 27 of 34 or 79.4 percent to a 1:1,000 dilution of lot B–2; whereas only 4 of 37 or 10.8 percent reacted to the same dilution of lot B–1, and only 2 of 33 or 6.1 percent to a 1:1,000 dilution of B–11. If the concentrations of various lots of blastomycin were increased, an increasing percentage of animals reacted. For example, although 10.8 percent of the animals infected with *Blastomyces* reacted to a 1:1,000 dilution of lot B–1, 75 percent reacted to a 1:100 dilution.

From these data, then, it is evident that the number of animals infected with *Histoplasma* which reacted to histoplasmin depends first, upon the particular lot of histoplasmin employed as a skin-testing antigen, and second, upon the dilution of this particular lot. Therefore, it would seem that if various lots of histoplasmin and blastomycin are to be used as antigens for intradermal testing of sensitization to the respective fungi or their products, some method of standardization of the various lots of antigen must be employed.

There are several methods of standardization employed for biological products. One common method is to adjust the concentrations of different lots of antigen so that they agree in terms of percentage of reactors obtained with any given dilution; thus, each lot might

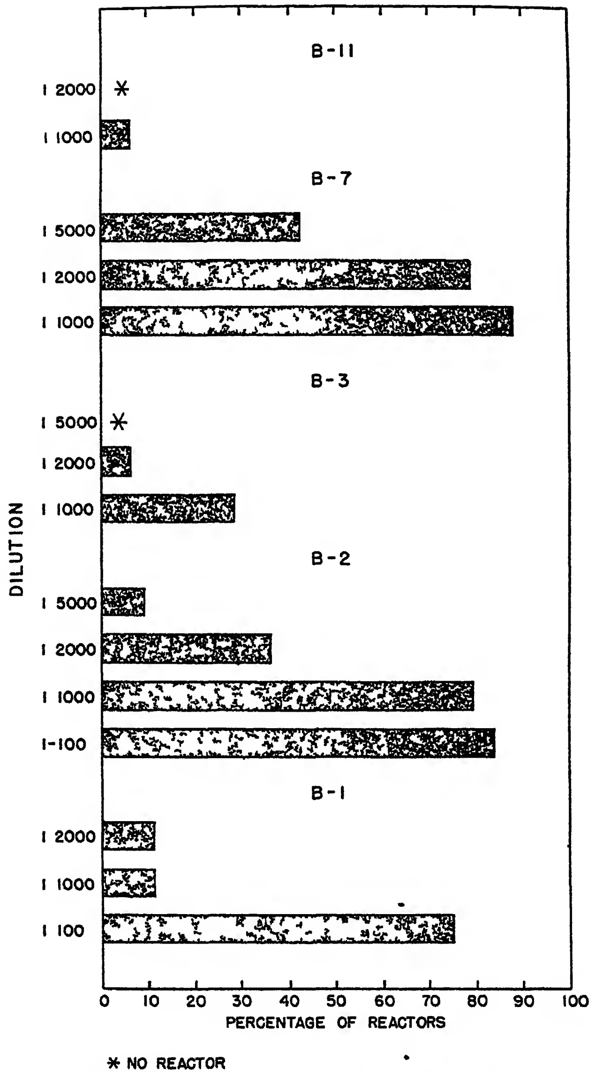

FIGURE 2—Titration of specified lots of blastomycin on guinea pigs experimentally infected with *B dermatitidis*

be concentrated or diluted so that a 1:1,000 dilution of all lots would detect some stated percentage of sensitized animals Another method is to disregard the standard dilution and employ a concentration of each lot which would detect a like percentage of sensitized animals. For example, a 1.100 dilution of one lot would be equal to a 1:2,000 dilution of another lot, since each would detect the same percentage of reactors among sensitized animals In this study, the second method was employed

It is evident, then, from the data presented, that a dilution between 1:2,000 and 1:5,000 of lot H–6 histoplasmin is essentially comparable in skin-reacting potency to a 1:1,000 dilution of lot H–15 or a 1:100 dilution of lot H–1, since these dosages of histoplasmin gave reactions in 97.5–80.0 percent, 89.4 percent, and 91.5 percent, respectively, of animals infected with *Histoplasma.*

Similar results were obtained with various lots of blastomycin used on guinea pigs infected with *Blastomyces.* For example, from the data in table 2 and figure 2, it would seem that lot B–7 blastomycin, diluted 1:2,000, is comparable to lot B–2, diluted 1:1,000, or to lot B–1, diluted 1:100, since these dosages of blastomycin detected 78.8 percent, 79.4 percent, and 75 percent, respectively, of all animals known to be infected with *Blastomyces dermatitidis.*

It would appear, then, from the data presented, that fairly accurate comparisons of the potency of different lots of histoplasmin or blastomycin can be made by comparisons of the percentage of reactors obtained in infected animals. To obtain any given percentage of reactors, therefore, markedly different dilutions of different lots might have to be employed.

Furthermore, it would seem to be of great importance to determine, as accurately as possible, the *dosage* or *titer* of any new antigen which should be used to detect sensitization due to the organism from which the antigen was made. In the determination of such a *dosage* or *titer*, there are obvious practical difficulties. If, for instance, the titer were defined as the minimum dosage which would detect sensitization of 100 percent of the animals experimentally infected with the homologous organism, this dosage might be so high that many normal animals would react. The necessity to consider the latter point is evident in the material given in table 3, which shows that 88.1 percent of normal animals reacted to undiluted H–15, 90.9 percent to undiluted B–7, and 90 percent to a 1:10 dilution of the heat-killed antigen prepared from yeast-phase cultures of *Histoplasma capsulatum.*

If, however, the *titer* is defined as the minimum dosage which would detect less than 100 percent of the sensitized animals, then some arbitrarily selected percentage value must be designated. In this connection, it must be recognized that, in any practical experiment, the percentage of reactors is subject to a large sampling error unless a very large number of animals is used, and that not every animal employed will necessarily become sensitized. The latter is particularly true of fungus infections, even though each animal is given an infecting dose which is usually sufficient to produce sensitization of normal animals. Therefore, it would seem reasonable to say that a critical *dosage* or *titer* of any antigen, or lot of antigen, should be defined as the minimum amount which would detect

TABLE 3.—*Results of testing normal guinea pigs with various dilutions of specified lots of histoplasmin, blastomycin, and heat-killed yeast-phase antigens of* Histoplasma capsulatum *and* Blastomyces dermatitidis

Item	Histoplasmin [1]				Blastomycin [1]				Heat-killed yeast-phase antigens		
	Lot H-15 (dilution)		Lot H-1 (dilution)		Lot B-7 (dilution)		Lot B-1 (dilution)		*Histoplasma capsulatum* (dilution)		*Blastomyces dermatitidis* (dilution)
	Undiluted	1:10	Undiluted	1:10	Undiluted	1:10	Undiluted	1:10	1:10	1:100	1:100
Number of animals tested	59	19	19	10	11	11	40	20	10	84	84
Number of reactors	52	1	0	0	10	0	6	0	9	0	0
Percentage of reactors	88.1	5.3	0	0	90.9	0	15.0	0	90.0	0	0
Average diameter of reactions [2]	8.6	5.0	-------	-------	7.8	-------	5.3	-------	6.7	-------	-------

[1] None of the animals was a reactor to a 1:100 dilution of these antigens.
[2] Induration in millimeters.

sensitivity in approximately 80 to 90 [3] percent of a group of animals experimentally treated in such a way that all can be expected to become sensitive to an antigen prepared from the homologous organism. At the same time, increasing doses will detect a small number of sensitized animals which did not react to the critical *titer*. However, since a 1:1,000 dilution of lot H-15 histoplasmin detected, or produced a reaction, in 89.4 percent of the guinea pigs included in this study which were infected with *Histoplasma* (table 1, fig. 1), it would appear that there would be little justification for using this particular lot of histoplasmin in concentrations much greater than this.

The evidence presented, therefore, suggests that the *titers* of the antigens included in this study would be approximately as follows for guinea pigs infected with the homologous organism: lot H-6 histoplasmin, between 1 : 2,000 and 1 : 5,000; lot H-15, 1 : 1,000; lot H-1, 1:100; lot B-7 blastomycin, 1 : 2,000; lot B-2, 1 : 1,000; lot B-1, 1 : 100; lots B-3 and B-11, *titer* undetermined.

Yeast phase antigens.—Each guinea pig employed for the titration of the various lots of histoplasmin and blastomycin was tested with a 1 : 100 dilution of each of the heat-killed yeast-phase antigens prior to infection. No reactions were observed in any of these animals. The results of testing the group infected with *Histoplasma capsulatum* with several dilutions of the heat-killed yeast-phase antigens of *Histoplasma capsulatum* are shown in table 4 and figure 3. Similarly,

[3] The selection of these values involves a consideration of many practical and theoretical points, a complete discussion of which is beyond the scope of this paper.

TABLE 4.—*Results of testing with various dilutions of a heat-killed yeast-phase antigen of* Histoplasma capsulatum *in guinea pigs experimentally infected with* Histoplasma capsulatum

Item	Dilution		
	1:100	1:1,000	1:2,000
Number of animals tested	47	47	21
Number of reactors	47	45	18
Percentage of reactors	100.0	93.7	85.7
Average diameter of reaction [1]	10 2	6.5	6.6

[1] Induration in millimeters.

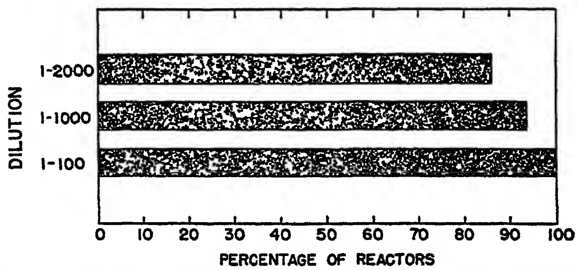

FIGURE 3.—Titration of heat-killed yeast phase antigen of *H. capsulatum* on guinea pigs experimentally infected with *H. capsulatum.*

the results of testing the group infected with *Blastomyces dermatitidis* with the heat-killed yeast-phase antigen of *Blastomyces* are summarized in table 5 and figure 4.

TABLE 5.—*Results of testing with various dilutions of a heat-killed yeast-phase antigen of* Blastomyces dermatitidis *in guinea pigs experimentally infected with* Blastomyces dermatitidis

Item	Dilution			
	1:100	1:1,000	1:2,000	1:4,000
Number of animals tested	37	37	35	35
Number of reactors	32	31	21	17
Percentage of reactors	86.8	83 8	60.0	48.6
Average of diameter of reaction [1]	7.6	7.2	6.4	6.2

[1] Induration in millimeters.

It can be seen from the data that heat-killed suspensions of the yeast phase of both *Histoplasma capsulatum* and *Blastomyces dermatitidis* are effective antigens for intradermal testing in guinea pigs. As with histoplasmin and blastomycin, however, the problem of the *titer* of these antigens is important. It would seem from the data presented in tables 4 and 5 and figures 3 and 4, and for the reasons stated above, that the critical *titer* would be a concentration of not more than a 1: 2,000 dilution of a heat-killed suspension of the yeast phase of *Histoplasma capsulatum* or a 1: 1,000 dilution of a similar sus-

pension of the yeast phase of *Blastomyces dermatitidis*, since these amounts gave reactions in 85.7 percent and 83.8 percent, respectively, of all animals infected with *Histoplasma capsulatum* or *Blastomyces dermatitidis*. It is also evident, from a comparison of tables 1 and 2

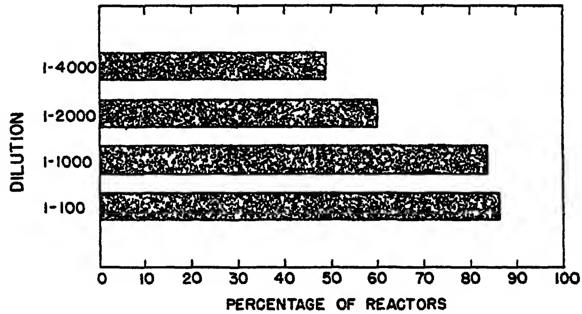

FIGURE 4.—Titration of heat-killed yeast phase antigen of *B. dermatitidis* on guinea pigs experimentally infected with *B. dermatitidis*.

and figures 1 and 2 with tables 4 and 5 and figures 3 and 4, that a filtrate-type antigen, such as histoplasmin or blastomycin, is as effective for intradermal testing as an antigen prepared from the parasitic phase of these two fungi, provided proper attention is paid to the *titer* of the particular antigen employed. This confirms the work of Christie and Peterson (*2*), who reported that the yeast phase of *Histoplasma capsulatum* yields a very satisfactory antigen and that guinea pigs which received sublethal but infective doses of live *Histoplasma capsulatum* yeast cells develop skin reactions qualitatively similar to those observed in man.

II. *The degree of sensitivity of the animals and its effect on the titer of the antigens*

In another series of animals, an attempt was made to study the problem of the *titer* of filtrate antigens prepared from the mycelial phase of certain fungi and of heat-killed antigens prepared from the yeast phase of the same fungi for intradermal testing. In this experiment, however, some difficulty was encountered in obtaining reactions to the antigens employed. Relatively low values were obtained for the *titers* of these antigens, even though the same lots of histoplasmin and blastomycin (H–1 and B–1) and the same heat-killed yeast-phase antigens of *Histoplasma capsulatum* and *Blastomyces dermatitidis* were employed as were used in the experiments described above.

In this study, 66 guinea pigs were used. After testing each animal with a 1:100 dilution of each of the four antigens intradermally, to which none reacted, 32 were infected with a small amount of a saline

suspension of the yeast phase of *Histoplasma capsulatum* and 34 with a similar suspension of *Blastomyces dermatitidis*.

Several weeks after infection, and at intervals thereafter, these animals were tested with a 1:100 dilution of each type of antigen. Since these tests consistently produced nonreactors, most of the animals were reinfected and retested. The results of the final tests are summarized in tables 6 and 7 and in figures 5 and 6.

TABLE 6.—*Results of testing with histoplasmin, lot H-1, and a heat-killed yeast-phase antigen of* Histoplasma capsulatum *in guinea pigs experimentally infected with* Histoplasma capsulatum

Item	Heat killed yeast phase antigen (dilution)			Histoplasmin H-1 (dilution)	
	1:100	1:1,000	1:2,000	1:100	1:1,000
Number of animals tested	32	32	31	32	32
Number of reactors	31	23	14	12	0
Percentage of reactors	96.9	71.9	45.2	37.5	0
Average diameter of reaction [1]	7.6	6.1	5.6	6.8	----------

[1] Induration in millimeters.

TABLE 7.—*Results of testing with Lot B-1 blastomycin and a heat-killed yeast-phase antigen of* Blastomyces dermatitidis *in guinea pigs experimentally infected with* Blastomyces dermatitidis

Item	Heat killed yeast phase antigen (dilution)			Blastomycin B-1 (dilution)	
	1:100	1:1,000	1:2,000	1:100	1:1,000
Number of animals tested	34	33	30	34	27
Number of reactors	33	16	5	15	1
Percentage of reactors	97.1	48.5	16.7	44.1	3.7
Average diameter of reaction [1]	7.9	6.5	5.2	7.7	5.0

[1] Induration in millimeters.

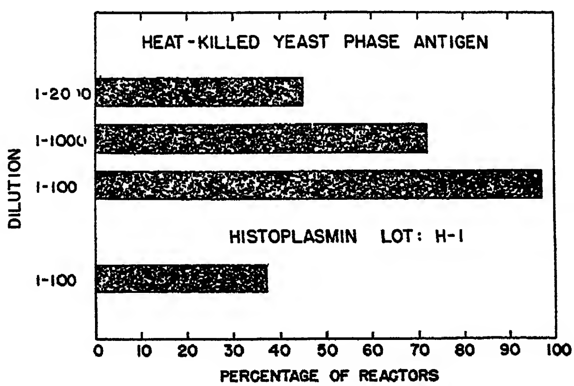

FIGURE 5.—Titration of heat-killed yeast phase antigen of *H. capsulatum* and Lot H-1 histoplasmin on guinea pigs experimentally infected with *H. capsulatum*.

In this group of animals, only 12 of 32 or 37.5 percent reacted to an intradermal injection of a 1:100 dilution of lot H–1 histoplasmin, although 31 of 32 or 96.9 percent reacted to a 1:100 dilution and 23 of 32 or 71.9 percent to a 1:1,000 dilution of the heat-killed yeast-

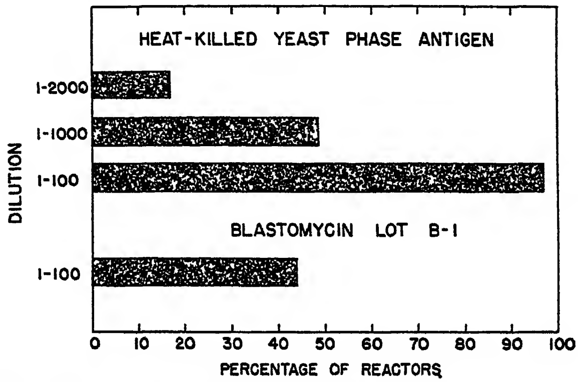

FIGURE 6.—Titration of heat-killed yeast phase antigen of *B. dermatitidis* and Lot B–1 blastomycin on guinea pigs experimentally infected with *B. dermatitidis*.

phase antigen of *Histoplasma*. From these data, then, it would seem that the *titer* of lot H–1 histoplasmin would be greater than a 1:100 dilution, since this amount detected only 37.5 percent of the animals infected with *Histoplasma capsulatum;* and the *titer* of the yeast antigen would probably be between a 1:100 and a 1:1,000 dilution, since these dilutions detected 96.9 percent and 71.9 percent of the infected animals, respectively.

Similar results were obtained with lot B–1 blastomycin and the heat-killed yeast-phase antigen of *Blastomyces dermatitidis*, as shown in table 7 and figure 6. The *titer* of lot B–1 blastomycin would appear to be greater than a 1:100 dilution, since this dosage detected only 15 of 34 or 44.1 percent of the animals infected with *Blastomyces*. The *titer* of the yeast-phase antigen would appear to be between a 1:100 and a 1:1,000 dilution, since these dilutions detected 97.1 percent and 48.5 percent, respectively, of the infected animals.

It is evident, then, that the percentage of animals in the two groups which reacted to the same dilution of the same antigen was quite different and that, therefore, the value obtained for the *titer* of each antigen varied markedly with the two groups of animals studied. For example, a 1:100 dilution of lot H–1 histoplasmin detected only 12 of 32 or 37.5 percent (table 6, fig. 5) of one group of guinea pigs infected with *Histoplasma capsulatum*, whereas the same dilution of the same lot of histoplasmin (H–1) detected 43 of 47 or 91.5 percent of the other group of animals (table 1) infected with the same fungus. Similarly, a 1:2,000 dilution of the heat-killed yeast-phase antigen of *Histoplasma* gave reactions (table 6, fig. 5) in 14 of 31 or 45.2 per-

cent of the animals in one group. In the other group (table 4, fig. 3) a 1:2,000 dilution gave reactions in 18 of 21 or 85.7 percent.

Comparable results were obtained with lot B–1 blastomycin and with the heat-killed yeast-phase antigen of *Blastomyces dermatitidis* in the two groups of animals infected with *Blastomyces*.

It would seem, therefore, that in order to explain these variable results, several factors must be considered. First, it is well known that in any infection a definite time interval must elapse between the time of infection and the time at which sensitivity to the infective organism or its products can be demonstrated. Second, it would seem that, as an animal begins to develop sensitivity to an infecting or sensitizing agent, an antigen prepared from that organism or its products, if applied as an intradermal testing agent, would have to be used in much greater concentration in order to elicit a reaction than would be necessary to elicit the same reaction after sensitivity to that organism or its products has become fully established. For example, if an animal were infected with a fungus and shortly thereafter an antigen prepared from that fungus or its products were used as an intradermal testing agent, it would seeem that this animal might react to a relatively high concentration of the antigen but not react to a lower concentration of the same antigen. Later, if the tests are repeated, both dilutions might give rise to reactions, due to the increased level of sensitivity of the animal. If this is true, a false impression of the *titer* of an antigen of unknown strength would be obtained if the tests were applied before the animals had developed a high level of sensitivity. That is, the value obtained for the *titer* of the antigen would be too low. If, for example, the value for the *titer* of lot H–1 histoplasmin for guinea pigs infected with *Histoplasma capsulatum* were accepted on the basis of one group of animals studied (table 6, fig. 5), it would appear to be greater than a 1:100 dilution, since this amount gave reactions in only 12 of 32 or 37.5 percent of the animals infected. However, in the other group of animals studied (table 1, fig. 1), it was shown that the *titer* of this antigen was approximately a 1:100 dilution, since in this group of animals this dosage gave reactions in 43 of 47 or 91.5 percent of the animals.

Similar results were obtained with the heat-killed yeast-phase antigen of *Histoplasma* on the same two groups of guinea pigs. The *titer* of this antigen as determined from one group of animals (table 6, fig. 5) appeared to be not more than a 1:100 dilution, since this dosage detected 31 of 32 or 96.9 percent of the animals, whereas a 1:1,000 dilution detected only 23 of 32 or 71.9 percent, and a 1:2,000 dilution, only 14 of 31 or 45.2 percent. In the other group, however (table 4, fig. 3), it was found that the *titer* of this antigen appeared

to be approximately a 1:2,000 dilution since this dosage detected 18 of 21 or 85.7 percent of the infected animals.

It would appear, therefore, that the animals in the group reported in tables 6 and 7 and in figures 5 and 6 were tested at a time when their level of sensitivity was low, and that, therefore, the values obtained for the *titers* of the various antigens employed were too low.

This hypothesis, that the level of sensitivity of the animals employed to determine the *titer* of an antigen is of great importance, was further tested by a study of lot B–2 blastomycin and the heat-killed antigen prepared from yeast-phase cultures of *Blastomyces dermatitidis* in an additional group of 11 guinea pigs. These animals were tested with both antigens intradermally and then infected with the yeast phase of *Blastomyces dermatitidis*, as described above. They were then retested with a 1:100 and a 1:1,000 dilution of lot B–2 blastomycin and the yeast-phase antigen 25 and 35 days after infection. The results of these tests are summarized in table 8 and figure 7.

TABLE 8.—*Results of testing with a heat-killed yeast-phase antigen of* Blastomyces dermatitidis *and lot B–2 blastomycin, 25 and 35 days after inoculation, in guinea pigs experimentally infected with* Blastomyces dermatitidis.

Item	Heat-killed yeast antigen			Blastomycin B-2		
	Number of days after inoculation					
	25		35	25		35
	Dilution			Dilution		
	1:100	1:1,000	1:1,000	1:100	1:1,000	1:1,000
Number of animals tested	11	11	11	11	11	11
Number of reactors	10	7	10	4	1	7
Percentage of reactors	90 9	63.7	90 9	36 4	9.1	63.7
Average diameter of reaction [1]	5.7	5.7	7 1	5 8	7.0	7.4

[1] Induration in millimeters.

As shown in table 8 and figure 7, when these animals were tested with the heat-killed yeast-phase antigen 25 days after infection with *Blastomyces dermatitidis*, 10 of 11 or 90.9 percent reacted to a 1:100 dilution, and 7 of 11 or 63.7 percent reacted to a 1:1,000 dilution; whereas 35 days after infection, 10 of 11 or 90.9 percent of the same animals reacted to a 1:1,000 dilution. There was also a definite increase in the average size of the reaction to a 1:1,000 dose. For example, at 25 days the diameter of the indurated area of reaction to a 1:1,000 dilution averaged 5.7 mm., whereas after 35 days it was increased to 7.1 mm. A similar increase in the response to blastomycin was observed. After 25 days, only 1 of 11 animals or 9.1 per-

cent reacted to a 1:1,000 dilution of blastomycin, lot B-2, whereas after 35 days, 7 of 11 or 63.7 percent of the same animals reacted to the same dilution of the same antigen. These data would seem to confirm the hypothesis that, in the titration of antigens on infected

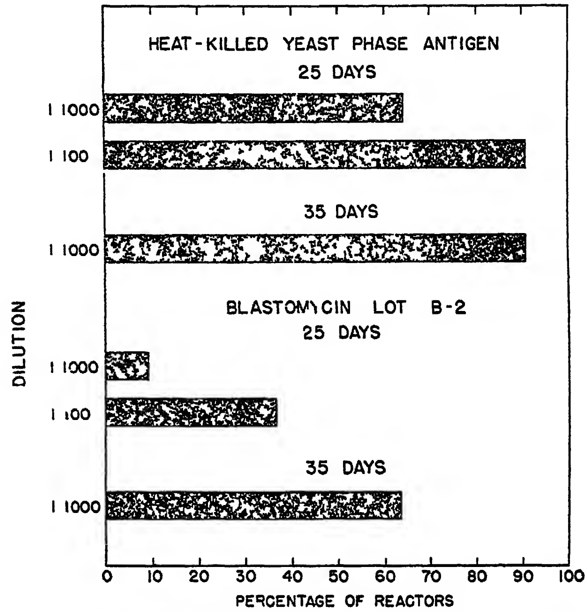

FIGURE 7.—Titration of heat-killed yeast phase antigen of *B. dermatitidis* and Lot B-2 blastomycin on guinea pigs experimentally infected with *B. dermatitidis* 25 and 35 days after infection.

animals, the level of sensitivity of the animals at the time the tests are performed is a very important factor, and one which must be taken into consideration. If the sensitivity of the animals tested is not at a high level, the *titer* determined on these animals will be too low.

III. *Cross reactions of histoplasmin and blastomycin*

In addition to the experiments described above, in which various lots of histoplasmin and blastomycin and heat-killed antigens prepared from cultures of the yeast phase of both *Histoplasma capsulatum* and *Blastomyces dermatitidis* were used as intradermal testing agents on guinea pigs experimentally infected with the homologous fungi, the cross reactions of each of these antigens were also studied.

At the same time that the group of animals infected with *Histoplasma* reported in table 1 were tested with various dilutions of each of the homologous antigens, they were also tested with various dilutions of several lots of blastomycin and the heat-killed antigen prepared from the yeast phase of *Blastomyces*. Similarly, the animals infected with *Blastomyces* reported in table 2 were tested with various

dilutions of several lots of histoplasmin and the heat-killed antigen prepared from cultures of the yeast phase of *Histoplasma.* The results of these tests are summarized in tables 9 and 10 and in figures 8 and 9.

TABLE 9.—*Results of testing with various dilutions of specified lots of histoplasmin and various dilutions of a heat-killed yeast-phase antigen of* Histoplasma capsulatum *in guinea pigs experimentally infected with* Histoplasma capsulatum *or* Blastomyces dermatitidis

Antigen	Histoplasmin									Heat-killed yeast-phase antigen		
Lot number	H-6				H-15			H-1				
Dilution	1:100	1:1,000	1:2,000	1:5,000	1:100	1:1,000	1:2,000	1:100	1:1,000	1:100	1:1,000	1:2,000
Item	Animals infected with *Histoplasma capsulatum*											
Number of animals tested	-----	40	40	40	47	47	40	47	47	47	47	21
Number of reactors	-----	39	39	32	47	42	13	43	2	47	45	18
Percentage of reactors	-----	97.5	97.5	80.0	100.0	89.4	32.5	91.5	4.3	100.0	93.7	85.7
Average diameter of reactions [1]	-----	8.8	7.1	6.3	[2] 9.0	9.7	6.9	8.8	6.0	10.2	6.5	6.6
	Animals infected with *Blastomyces dermatitidis*											
Number of animals tested	32	32	32	32	32	32	32	37	37	37	37	37
Number of reactors	27	9	1	0	24	5	0	3	0	24	3	2
Percentage of reactors	84.4	28.1	3.1	0	75.0	15.7	0	8.1	0	64.9	8.1	5.9
Average diameter of reactions [1]	8.8	5.3	5.0	-----	7.3	5.3	-----	5.3	-----	6.5	6.0	6.0

[1] Induration in millimeters.
[2] Based on measurement of 5 animals.

TABLE 10.—*Results of testing with various dilutions of specified lots of blastomycin and various dilution of a heat-killed yeast-phase antigen of* Blastomyces dermatitidis *in guinea pigs experimentally infected with* Blastomyces dermatitidis *or* Histoplasma capsulatum.

Antigen	Blastomycin					Heat-killed yeast-phase antigen	
Lot number	B-7			B-2			
Dilution	1:100	1:1,000	1:2,000	1:100	1:1,000	1:100	1:1,000
Item	Animals infected with *Blastomyces dermatitidis*						
Number of animals tested	-------	33	33	37	34	37	37
Number of reactors	-------	29	26	31	27	32	31
Percentage of reactors	-------	87.9	78.8	83.8	79.4	86.8	83.8
Average diameter of reactions [1]	-------	9.0	7.9	[2] 6.9	7.4	7.6	7.2
	Animals infected with *Histoplasma capsulatum*						
Number of animals tested	40	40	40	47	47	47	47
Number of reactors	23	5	2	19	5	39	4
Precentage of reactors	57.5	12.5	5.0	40.5	10.7	82.9	8.5
Average diameter of reactions [1]	6.5	5.3	5.5	7.7	5.0	6.1	5.5

[1] Induration in millimeters.
[2] Based on measurement of 10 animals.

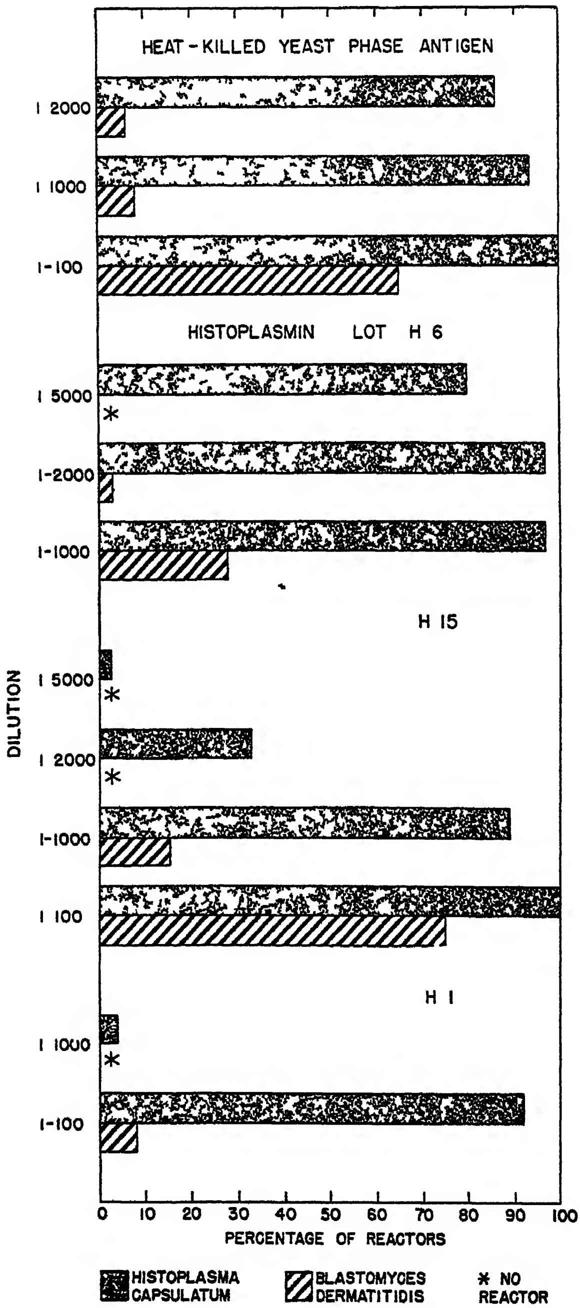

FIGURE 8.—Titration of heat killed yeast phase antigen of *H capsulatum* and histoplasmin on guinea pigs experimentally infected with *H capsulatum* and *B dermatitidis*

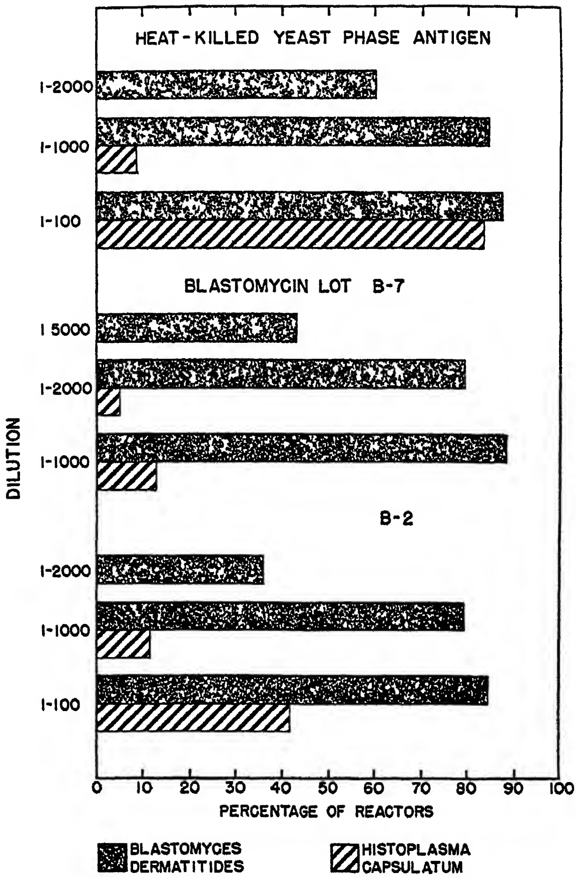

FIGURE 9.—Titration of heat-killed yeast phase antigen of *B dermatitidis* and blastomycin on guinea pigs experimentally infected with *B dermatitidis* and *H capsulatum.*

It is evident from the data presented in tables 9 and 10 and in figures 8 and 9 that most of the guinea pigs experimentally infected with *Blastomyces dermatitidis* reacted also to each lot of histoplasmin employed and to the heat-killed antigen prepared from cultures of the yeast phase of *Histoplasma.* Similarly, most of the animals experimentally infected with *Histoplasma capsulatum* reacted also to each lot of blastomycin and to the heat-killed antigen prepared from cultures of the yeast phase of *Blastomyces dermatitidis.*

However, in both groups, as in the reactions of these animals to the homologous antigens (tables 1 and 2), the percentage of cross reactions with any antigen is seen to depend first upon the particular antigen or lot of antigen employed, and second upon the dilution of that antigen or lot. For example, when lot H–6 histoplasmin was used on guinea pigs infected with *Histoplasma,* 39 of 40 or 97.5 percent (table 9)

reacted to either a 1:1,000 or a 1:2,000 dilution; when used on guinea pigs experimentally infected with *Blastomyces*, only 9 of 32 or 28.1 percent (table 9) reacted to a 1:1,000 dilution, and 1 of 32 or 3.1 percent to a 1:2,000 dilution of H–6. When, however, the concentration of this histoplasmin was increased to a 1:100 dilution, 27 of 32 or 84.4 percent of the guinea pigs infected with *Blastomyces* reacted. Conversely, when the concentration of histoplasmin was decreased to a 1:5,000 dilution, 32 of 40 or 80 percent of the animals infected with *Histoplasma* reacted, but none of the 32 infected with *Blastomyces* reacted. Similarly, when lot H–15 was used in a 1:1,000 dilution as the testing agent, 42 of 47 or 89.4 percent of the animals infected with *Histoplasma*, but only 5 of 32 or 15.7 percent of the animals infected with *Blastomyces*, reacted. When the concentration was increased to a 1:100 dilution, 100 percent of 47 animals infected with *Histoplasma* and 75 percent of 32 animals infected with *Blastomyces* reacted.

Similar results were obtained with two lots of blastomycin and the heat-killed antigen prepared from the yeast phase of *Blastomyces*. For example, when lot B–2 blastomycin was tested on animals infected with *Blastomyces* (table 10), 27 of 34 or 79.4 percent reacted to a 1:1,000 dilution, whereas only 5 of 47 or 10.7 percent of those infected with *Histoplasma* reacted. When, however, the concentration was increased to a 1:100 dilution, then 31 of 37 or 83.8 percent of those infected with *Blastomyces* reacted, but only 19 of 47 or 40.5 percent of those infected with *Histoplasma* reacted.

In addition to the differences in the number and percentage of animals infected with these two fungi which reacted to the same dilution of any particular antigen, marked differences also occurred in the average size of the reaction. For example, a 1:1,000 dilution of lot H–6 histoplasmin produced an average indurated area 8.8 mm. in diameter in animals infected with the homologous fungus (table 9) but the same amount of the same lot of histoplasmin produced an average diameter only 5.3 mm. in animals infected with *Blastomyces*. Similar differences in the average size of the indurated area were obtained with all antigens and all dilutions employed (tables 9 and 10).

A comparison of the data in table 3 with those in tables 9 and 10 brings out the fact that, in the case of animals infected with *Histoplasma* or *Blastomyces*, infection with one fungus increases the sensitivity of an animal to an antigen prepared from the other fungus. For example, none of 32 guinea pigs reacted to a 1:100 dilution of H–15 histoplasmin before infection with *Blastomyces*, but 75 percent reacted to this dilution of H–15 after infection with *Blastomyces*. It would appear, nevertheless, while any antigen prepared from a culture of one fungus produces a reaction in guinea pigs experimentally

infected with the other fungus, the percentage and size of these cross reactions are dependent on the dosage of the particular antigen used.

It should also be pointed out that even though the percentage of reactors can be increased by increasing the dosage, the percentage of cross reactions is also increased, and by a much larger amount. For example, increasing the dosage of lot H–15 histoplasmin from a 1:1,000 dilution to a 1:100 dilution increased the percentage of reactors from 89.4 percent to 100 percent, and the percentage of cross reactions (the percentage of those animals infected with *Blastomyces* which reacted) was increased from 15.7 percent to 75 percent (table 9, fig. 8). This fact, then, would seem to be further evidence for the need to determine the critical *titer* of any antigen to be used for intradermal testing. If the critical *titer* is determined for the various antigens included in this study, it would then seem that, with any particular antigen or lot of antigen, there are dilutions or dosages which will detect sensitization in most of the animals sensitized with the homologous organism and at the same time give relatively few cross reactions in animals sensitized by the heterologous organism. That is, if histoplasmin and blastomycin, and the antigens prepared from the yeast phase of these fungi, are used at their critical *titers*, then the percentage of cross reactions between histoplasmin and blastomycin in guinea pigs experimentally infected with *Blastomyces* and *Histoplasma* would be relatively small, varying from 3.1 to 15.7 percent in the animals included in this study, depending on the particular lot of histoplasmin or blastomycin employed.

In addition to the studies on the various lots of histoplasmin and blastomycin, the reactions of the same guinea pigs to tuberculin and coccidioidin were determined. The tuberculin employed was old tuberculin furnished by Mr. W. Steenken, Jr., of the Trudeau Laboratory, Trudeau, N. Y. One-tenth cubic centimeter of a 5-percent solution (5.0 mg.) was employed. The coccidioidin (lot No. 24) was furnished by Dr. C. E. Smith, Stanford University Medical School, and was used in a 1:100 dilution.

One animal infected with *Histoplasma* and three infected with *Blastomyces* gave small reactions (6–7 mm. indurated area at 48 hours) to old tuberculin. The cause of these reactions was not determined. None of the animals infected with *Blastomyces* and only one of those infected with *Histoplasma* reacted to a 1:100 dilution of coccidioidin. Therefore, although the *titer* of this lot of coccidioidin was not determined for guinea pigs in this study, it would seem that cross reactions of coccidioidin in guinea pigs experimentally infected with either of these fungi are negligible. This is in agreement with the findings of Emmons et al. (*3*).

The conclusion reached by Emmons (*3*) that there is a high degree

of cross reaction between histoplasmin and blastomycin in guinea pigs infected with *Blastomyces* and *Histoplasma* is not in agreement with the findings in this study. However, if the data presented by Emmons are analyzed according to the suggestions presented above (first, the determination of the critical *titer* of each antigen and second, the study of the cross reactions based on the critical *titer* of each antigen) it will be found that 12 of 24 or 50 percent of the animals infected with *Blastomyces* reacted to histoplasmin (lot H–3) and 9 of 15 or 60 percent of the animals infected with *Histoplasma* reacted to blastomycin (lot B–4). These degrees of cross reaction would not seem to support Emmons' conclusion that histoplasmin and blastomycin cross-react "almost completely" in experimental blastomycosis and histoplasmosis in guinea pigs. It would appear, also, from analysis of the figures of Emmons et al. (*3*) that the degree of cross reactions which he demonstrated, and which are larger than those found in this series, may have been due in part to a relatively low level or degree of sensitivity in his test animals. Therefore, it may have been necessary to use high concentrations of the antigens to elicit reactions in the test animals. However, it has been shown above that, if this is true, a false impression of the critical *titer* of the antigens will be obtained, and that at these concentrations a higher degree of cross reaction will be obtained than if the *titer* is determined at a time when the level of sensitivity is high.

It is clear from the material presented in this paper that cross reactions are intimately related to dosage and to the antigens used for testing. Before definite conclusions, therefore, can be drawn regarding specificity or lack of specificity, it is obvious that the whole problem must be much more completely investigated than has been accomplished in this or other work on the subject.

SUMMARY AND CONCLUSIONS

Three lots of histoplasmin, five of blastomycin, and heat-killed antigens prepared from yeast cultures of *Histoplasma capsulatum* and *Blastomyces dermatitidis* have been tested on guinea pigs experimentally infected with *Histoplasma capsulatum* and *Blastomyces dermatitidis*.

It has been shown that—

(1) The number of experimentally infected guinea pigs which reacted to histoplasmin, blastomycin, or the heat-killed yeast-phase antigens depends upon the particular lot of antigen employed and upon the dilution of this particular lot;

(2) Although antigens prepared from cultures of *Histoplasma capsulatum* or *Blastomyces dermatitidis* will give reactions in guinea pigs infected with either fungus, the percentage and size of these

cross reactions are dependent upon the dosage of the particular antigen employed;

(3) If the critical *titers* of these antigens are determined, and if these concentrations are used to study cross reactions, the degree of cross reaction between these antigens is small and the antigens are therefore relatively specific for guinea pigs experimentally infected with the homologous fungi;

(4) The level or degree of sensitivity of the animals employed to determine the *titer* of an antigen must be considered. That is, if the sensitivity level is low, a high concentration of the antigen will have to be used to elicit a reaction, and, therefore, a false impression of the critical *titer* of the antigen will be obtained. Such high concentrations of antigen will produce a high percentage of cross reactions.

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COMMUNITY-WIDE CHEST X-RAY SURVEYS

I. AN INTRODUCTION TO THE PROBLEM

By Francis J. Weber, *Medical Director, Chief, Tuberculosis Control Division, United States Public Health Service*

Within the past few years, millions of people throughout the world have been examined for tuberculosis by the mass X-ray technique. Indeed, in one year of operation the United States Public Health Service surveyed a million persons by means of miniature chest films. Within the next 5 years, if all resources are mobilized and a national plan is efficiently executed, a complete and exact picture of tuberculosis in the United States can be obtained. Not until every adult in the country has been examined by means of a chest X-ray film will the first great stride have been taken toward eradication of tuberculosis from the Nation.

The Tuberculosis Control Division of the United States Public Health Service is dedicated to the pursuit of four major objectives: (1) the discovery of every person in the country infected with tuberculosis, (2) isolation and medical care for every patient needing treatment, (3) after-care and rehabilitation, and (4) protection of the afflicted family against economic distress.

It is generally recognized that the first step in a well conceived program of tuberculosis control should be an extensive campaign of case finding. Properly, this step is the initial approach to the other three objectives, which must be sought directly when cases are discovered. The mass chest X-ray survey, then, is one of the most important techniques in the work of the Division.

In order to cope successfully with the problem of tuberculosis, the disease must be detected in the early stages of infection, so that treatment can be undertaken in time to protect the community and ensure the best possible prognosis for the individual. Experience has taught that it is costly to wait for patients to report findings that were formerly considered indicative of early tuberculosis. Indeed, such signs as hemoptysis, blood-streaked sputum, and pleurisy are more likely to point to a late case than an early one. We have learned to look for the disease in presumably healthy persons, and the result of case-finding programs has invariably been the discovery of tuberculosis unsuspected by the patient himself. Tuberculosis that can only be brought to light through an active search may constitute a menace to the community.

Detection of early cases is easily achieved by means of the photofluorograph. Repeated success has proved this instrument to be a practical and economical tool for the discovery of tuberculosis in the early, remediable stages. Thus, technical problems are now of minor

importance in the total work of case finding. In actual practice, the main difficulty is in getting people before the machine for examination. The purpose of the present article is to consider that problem in a preliminary way, and to introduce subsequent publications of the results of mass chest X-ray surveys conducted by the Division.

The present discussion deals primarily with tuberculosis case-finding surveys of entire communities. In the community-wide chest X-ray survey, the Division has limited the examination to persons 15 years of age or older. This procedure has saved the time and expense of surveying the younger group, a labor not usually fruitful, and has permitted completion of the work within specified periods of time. Community-wide examinations take from a few weeks to a few months to conduct. In Cleveland County, N. C., for example, the Division X-rayed 25,621 persons in 4 weeks; and in Gaston County, N. C., in cooperation with the North Carolina State Health Department, 50,828 were X-rayed in 6 weeks. Equally successful surveys of short duration were made in other parts of North Carolina, such as Wayne County, and in Savannah and Columbus, Ga.

Objection may be raised by those who believe that we should concentrate our efforts on special population groups rather than on the total populations of communities. And the question will be asked, Is it necessary to compress such a large examination program into so short a period of time? The Division is well aware of these two divergent views and appreciates the advantages represented in each. In the light of experience in this work, however, the Division has come to recognize the important place of the community survey in the national program of tuberculosis control, and perceives certain advantages in the short-term approach.

Certainly the community-wide survey would seem the best in small communities where no industrial or other group is readily accessible, and where no group deserves precedence because of an expected higher incidence of disease. In the small community of heterogeneous population, the chest X-ray survey must be community-wide.

Experience indicates, however, that mass-survey work need not be limited to small communities. Case-finding by the mass X-ray technique has proved successful in some metropolitan areas. Here, the examination of a part of the population seems to have equaled, in efficiency and service rendered, the examination of entire communities.

With regard to the time element, it is not necessary, of course, to survey the entire community in, say, 4 to 6 weeks—the time range of community surveys to date. Actually, it would suffice to cover the same number of persons in a 2-year period, or perhaps in as

long a period as 5 years. The Division, however, finds the short-term program more practical, at least in the smaller communities. In the first place, a long-term survey will usually necessitate the establishment of provisions for more or less permanent special services to the community. Generally, such services can only be afforded in the larger cities. There, it is often economically feasible to purchase one or more X-ray units and to keep a full-time staff occupied throughout the long-term period. But even in large cities, the short-term approach is sometimes preferable.

Extensive and thorough preparation must, of course, be made by a community that proposes to conduct a case-finding survey of the entire population 15 years of age and over. The community may consider several types of approach. First may be mentioned the "campaign" approach, a type so familiar as to need no special consideration. This consists in rapid organization of community members and in working up community interest to a sudden peak as the time of examination nears. The campaign type is generally of short duration; the entire program (preliminary publicity, examinations, etc) is frequently measured in days and requires no longer than a few weeks at most for completion. This approach has its place, but is limited in that its benefits are likely to be of a temporary nature if the survey is not followed by an extended educational program in the area.

The second type is the "continuous" program. In public health work, this approach is generally preferred, since it offers the advantages of joint planning by all community leaders and professional persons concerned. It assumes all possible assistance from public health and other civic officials, as well as from voluntary associations, labor leaders, unofficial civic groups, the medical profession, and everyone else with an interest in community life.

It must be remembered, however, that even the so-called "continuous" program, when applied to a communicable disease like tuberculosis, must be bounded by certain time limits. We must discover and isolate, as soon as possible, a sufficient number of open, infection-spreading cases to provide a marked reduction in disease hazard for the remaining population. In view of this, 2 to 5 years has been estimated as the maximum duration of a successful program in which the entire adult population is examined. Any program geared so low that more than 5 years is required for its completion may well be seriously questioned.

The experience of the Tuberculosis Control Division points to a combination of the two types as the best general approach. Since time limits in case-finding are imposed by epidemiological factors, most areas, and particularly the smaller communities, must conduct

intensive surveys. Outside help is therefore required in most instances, in order to provide the equipment and the number of specialists needed. This additional help must arise, as a rule, through cooperation with the State health department, or with the district health department if one exists for that work.

In association with State health departments, the photofluorographic units of the Public Health Service and the teams assigned to them have conducted several community-wide surveys on a demonstration basis within the past 2 years. The remainder of this article will discuss the demonstration program in general terms.

It should be emphasized here that the organization and conduct of community-wide chest X-ray surveys require joint planning on the part of many groups: (1) Official health departments, State and local, as well as other official agencies, such as welfare departments and vocational rehabilitation offices, (2) voluntary associations, State, local and others, and (3) the medical profession. Preparations for the survey cannot be made quickly. About 3 months is generally required before the necessary preparations can be completed.

In explaining the role of the United States Public Health Service in the community case-finding program, it should be mentioned that Congress has authorized the Tuberculosis Control Division to have in operation a number of demonstration units. At the present time, there are approximately 20 such units, of which about half are detailed to large community surveys. It is the work of this half that will be discussed here, since the other units are assigned individually to communities for work on a somewhat reduced scale.

When the Division is called upon to begin a demonstration survey, the first step is a request from the State or a local group for a demonstration. This request is followed by a preliminary meeting of Division members with State and local officials and with other groups concerned in the survey. These other groups which will participate in the program are selected by the official State and local agencies.

The question of need for a survey must first be considered. Since the number of demonstration units is limited and the Public Health Service is dedicated to serve the Nation, it is necessary that the Division avoid concentrating too much of its personnel and equipment in one section of the country. Rather, an attempt is made to begin in those areas having the greatest problem, and to extend the demonstrations gradually to other areas representative of their particular regions.

The first scene of the demonstration work has been the southeastern region of the United States, mainly because of the great interest on the part of officials there and because of the magnitude of the problem.

After the need for a survey is decided, an investigation is made of the ability of the area to fulfill other requirements:

1. The area must be one with a definite problem. Where the problem is regional in extent, an area within the region, typical with respect to the problem, is considered.

2. Since the work of the demonstration unit is confined to a definite period, the State or other sponsoring agency must evince a willingness to conduct an effective tuberculosis follow-up program after the unit has left the area. There must be evidence that adequate provisions exist for nursing, treatment, and other measures needed in the follow-up, or there must be reasonable assurance that such provisions will be made.

3. The community must demonstrate a willingness to cooperate in the continued support of the general public health program, as well as of the program of tuberculosis control.

If it is shown that these requirements can be met, the next step is taken—the planning of specific details. One of the first questions to be answered is the amount of time that will be spent on actual case-finding. This will depend upon a number of conditions, one of the most important being the type of community; that is, whether the community is predominantly rural or urban. Generally speaking, it will take longer to cover a rural population than an urban one. In the North Carolina demonstrations mentioned above, about twice as many persons were examined among the rural-urban population of Gaston County in 6 weeks as among the rural population of Cleveland County in 4 weeks. In these two counties, several X-ray units with full complements of personnel were employed, but in another community a great majority of the adult population was reached in a period of 6 months with only one unit.

When the probable amount of time to be spent on case-finding is determined, the Division considers the following demands:

1. The number of units required for the work. If operating conditions are satisfactory, a fully automatic unit with qualified personnel can expose and develop 500 X-ray films in an average working day. Many of the units have far exceeded this number, but all factors considered, 300 films may be accepted as a good daily average in actual practice.

2. The probable number of cases to be detected that will require treatment and follow-up.

3. The necessary facilities present in the community and other facilities that must be obtained—clinics, hospital beds, and health department facilities.

4. The facilities needed for follow-up. This will include estimates of medical, nursing, and record-keeping requirements, and of needed provisions for a continuous educational program with emphasis on interpretation of the control work and the disease.

5. The number of personnel needed to carry out the work within the time prescribed.

In all of this planning, a fundamental concept is observed: The aim of the Division in a case-finding survey is to obtain a good knowledge of the local tuberculosis problem, and to leave the community with

the majority of active cases either under treatment or with preliminary arrangements for treatment. In this way, the community will not be left with too large a task, but rather with an awakened consciousness of its tuberculosis control program and with a number of cases that it will be able to handle in its routine health department operations.

One of the basic considerations in any case-finding program is the question of support for the survey. In case-finding demonstrations, the Tuberculosis Control Division furnishes standard, fully automatic photofluorographic units employing 70-mm. roll film. With these units, the Division assigns medical officers for the organization of the survey and interpretation of results, and lends nurses, X-ray technicians, and reporting-methods analysts. The Public Health Service, in brief, furnishes the necessary equipment and personnel.

The work done by the Division, however, is only a part of the entire task, for a considerable amount of preliminary work is required, as well as a supplementary provision of funds on the part of the State and local organizations. Specifically, the State and local health departments have contributed the funds required for the employment of additional clerical personnel. In order to treat cases discovered during the survey, these departments have also provided clinic facilities, nurses, and other workers.

Additional financial support may be needed for organizing the community. In this respect, the Public Health Service limits its support to expert consultation in community organization, in order to assure a high degree of systematized community effort. The actual work of organizing the community is left to local groups, mainly to the voluntary associations, which cooperate with the appropriate local official agencies. In some areas, such groups as the chamber of commerce, civic clubs, and religious organizations have made important contributions for newspaper and other publicity to enlist support for the program.

As previously explained, the program of the Division combines the campaign and the continuous types of approach, with great stress placed upon community organization. In some of the programs, ordinary publicity media—radio, newspapers, pulpit and school announcements—sufficed to bring people out for the survey. In others, the Division added door-to-door canvassing, a technique found to be of value in war-bond and community-chest drives. It should be pointed out that good community organization is essential to the success of a demonstration program. Both the long- and short-term successes are determined by the quality of this organization, which is one of the most important elements in the planning.

The final step to be made before commencing the actual survey is to reach a formal agreement with the agencies concerned. In this,

the Division uses an agreement form which defines the project and presents a statement of obligations and responsibilities. Broadly speaking, the form specifies the following:

1. The Public Health Service will provide the technical personnel and technical equipment for the tuberculosis case-finding survey.

2. The State and local health departments will supply basic services, including clinical and follow-up facilities.

3. The community by means of publicity will do the basic organizing necessary to bring the people out for examination.

The community-wide chest X-ray survey has been compared to the modern military campaign; with respect to both tactics and objective, the analogy seems justified. Whatever we war against, we cannot expect victory if we resort to defense alone: we must attack. Organization, training, equipment, financial support, planning—all are of basic importance, whether we attack an army of men or man's common enemy, disease. The individual attack must be systematically planned and executed. Furthermore, a central plan and policy, designed to give direction in each phase of an extended campaign and to solve each new problem that may arise, are essential to the achievement of permanent, unconditional success.

The Tuberculosis Control Division of the United States Public Health Service has formulated the central plan, the policy. It is prepared to guide and assist in the discovery of every person in the country infected with tuberculosis, and to approach the other three objectives as this is accomplished. The community-wide chest X-ray survey, a technique of case-finding both rapid and thorough, is waging highly effective war against tuberculosis. The ultimate objective of the tuberculosis movement in the United States—complete eradication of the disease—can be attained through a combination of this and other techniques if they are applied relentlessly in a cooperative, Nation-wide program.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED APRIL 12, 1947

Summary

The reported incidence of influenza declined for the third consecutive week, and the total mortality, all causes, in 93 major cities in the United States declined for the second consecutive week. Exclusive of Kentucky (which reported 5,048 cases of "upper respiratory infection," as compared with 1,036 cases for the preceding week), the current total is 23,536 as compared with 35,939 for the preceding week.

According to the reports furnished the Public Health Service by the State health authorities, no extensive outbreaks of influenza have been reported this season in the New England, Middle Atlantic, and East North Central areas, although high school-absenteeism was reported from certain areas in New York State. The most severely affected areas, according to reported and estimated cases, were the South Atlantic, and South Central areas, Iowa and Kansas in the North Central group, and Colorado in the Mountain States. The State health officer of California reported extensive outbreaks in the northern part of the State during February and March, but the actual incidence was not indicated by the reported figures. This same situation probably obtained in other States, for which the reported figures fail to show the actual incidence of the disease.

During the current week, 7 cases of smallpox were reported in New York State, 4 of which were in New York City. (See p. 661.) Only 1 other case (in Mississippi) was reported during the week. A total of 76 cases has been reported to April 12 this year, as compared with 149 for the same period last year and a 5-year (1942-46) median of 184 cases for the period.

The reported incidence of poliomyelitis, tularemia, undulant fever, and whooping cough is above both last year's figures and the median expectancy, while the other communicable diseases listed in the following table are below or approximately at the median expectancy.

A total of 10,154 deaths was reported in 93 large cities in the United States, as compared with 10,193 last week, 10,820 for the next earlier week and 9,105 for the corresponding week last year. The accumulated total to date this year is 151,812, as compared with 150,718 for the same period last year.

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*Telegraphic morbidity reports from State health officers for the week ended Apr. 12, 1947, and comparison with corresponding week of 1946 and 5-year median**

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria, Week ended—Apr. 12, 1947	Diphtheria, Week ended—Apr. 13, 1946	Diphtheria, Median 1942-46	Influenza, Week ended—Apr. 12, 1947	Influenza, Week ended—Apr. 13, 1946	Influenza, Median 1942-46	Measles, Week ended—Apr. 12, 1947	Measles, Week ended—Apr. 13, 1946	Measles, Median 1942-46	Meningitis, meningococcus, Week ended—Apr. 12, 1947	Meningitis, meningococcus, Week ended—Apr. 13, 1946	Meningitis, meningococcus, Median 1942-46
NEW ENGLAND												
Maine	0	4	0	4	------	2	250	91	91	0	0	5
New Hampshire	0	0	0	8	1	------	9	125	27	0	1	1
Vermont	0	0	0	15	------	------	285	11	100	0	0	0
Massachusetts	9	3	4	------	------	------	360	1,816	1,314	1	2	5
Rhode Island	1	0	0	------	1	1	206	12	14	0	0	1
Connecticut	0	1	0	9	------	3	864	247	430	1	3	3
MIDDLE ATLANTIC												
New York	12	36	19	[1] 18	[1] 1	[1] 2	532	5,894	2,317	6	14	17
New Jersey	3	6	6	16	1	6	451	3,976	1,831	1	10	10
Pennsylvania	17	29	12	[2] 4	[2] 2	[2] 2	283	3,409	1,204	7	13	13
EAST NORTH CENTRAL												
Ohio	10	24	13	32	5	11	582	916	916	13	3	9
Indiana	4	12	3	17	5	7	120	768	224	0	5	5
Illinois	4	15	17	16	4	6	92	1,352	1,281	16	10	13
Michigan [3]	4	9	8	11	------	1	69	2,508	812	7	4	5
Wisconsin	4	2	2	290	36	36	326	4,222	2,277	2	4	4
WEST NORTH CENTRAL												
Minnesota	2	7	2	3	------	1	96	53	153	4	3	3
Iowa	0	5	5	1,576	------	------	181	148	204	2	2	2
Missouri	25	4	4	7	3	3	6	73	392	3	1	6
North Dakota	0	2	1	2	------	4	7	8	55	1	0	0
South Dakota	1	1	2	------	------	------	12	38	38	0	0	0
Nebraska	2	0	1	------	3	2	8	579	311	1	0	0
Kansas	4	3	3	72	5	4	4	693	623	0	1	3
SOUTH ATLANTIC												
Delaware	0	0	0	------	------	------	------	29	13	1	1	1
Maryland [3]	14	8	5	11	1	6	23	567	521	5	2	10
District of Columbia	0	0	0	------	1	1	44	212	83	2	0	2
Virginia	4	4	4	4,673	114	274	288	771	488	3	5	8
West Virginia	4	8	3	935	2	5	22	123	123	3	1	2
North Carolina	6	9	9	------	------	2	221	623	623	5	2	8
South Carolina	9	5	4	2,650	292	292	210	427	251	0	0	1
Georgia	5	0	1	485	5	43	155	216	216	0	3	4
Florida	2	4	3	109	2	3	127	139	139	1	3	3
EAST SOUTH CENTRAL												
Kentucky	8	6	44	([4])	45	4	3	430	126	3	3	7
Tennessee	5	5	3	741	27	43	96	286	286	3	1	2
Alabama	1	7	7	727	11	87	188	235	235	5	4	6
Mississippi [3]	3	6	6	118	------	------	16	------	------	1	3	3
WEST SOUTH CENTRAL												
Arkansas	3	3	2	1,255	35	35	113	229	193	2	2	2
Louisiana	2	4	4	300	15	15	26	102	102	0	1	2
Oklahoma	3	0	3	3,347	69	79	11	344	304	1	2	2
Texas	18	34	29	3,896	635	690	374	2,107	2,107	10	9	9
MOUNTAIN												
Montana	0	4	1	571	4	3	162	123	123	0	0	0
Idaho	0	0	0	63	8	1	12	122	78	0	0	0
Wyoming	0	0	0	------	------	------	19	60	79	0	0	1
Colorado	9	4	4	641	20	25	93	890	279	0	0	0
New Mexico	0	1	1	7	1	2	77	24	24	0	0	0
Arizona	8	15	1	165	78	78	81	258	155	0	1	1
Utah [3]	1	0	0	98	3	2	13	555	207	0	1	0
Nevada	0	0	0	------	------	------	------	11	16	0	0	0
PACIFIC												
Washington	2	7	5	480	------	2	28	786	209	2	2	3
Oregon	1	7	7	85	2	13	27	315	208	0	1	1
California	20	12	12	79	29	29	178	3,823	2,795	10	8	22
Total	230	316	244	23,536	1,466	1,917	7,350	40,746	27,161	122	131	194
15 weeks	4,231	5,568	4,478	266,137	179,321	67,152	82,918	301,196	262,946	1,322	2,837	3,617
Seasonal low week [5]	(27th) July 5-11			(30th) July 26-Aug. 1			(35th) Aug. 30-Sept. 5			(37th) Sept. 13-19		
Total since low	11,797	17,212	13,214	299,112	541,569	103,014	105,805	327,320	300,959	2,294	4,341	6,069

*Cumulative totals for 1947 are exclusive of figures for Pennsylvania for week ended Apr. 5.

[1] New York City only. [2] Philadelphia only. [3] Period ended earlier than Saturday.

[4] Kentucky reported 5,048 cases of influenza (upper respiratory infection), as compared with 1,036 last week, not included in the totals.

[5] Dates between which the approximate low week ends. The specific date will vary from year to year.

Telegraphic morbidity reports from State health officers for the week ended Apr. 12, 1947, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended—		Median 1942-46	Week ended—		Median 1942-46	Week ended—		Median 1942-46	Week ended—		Median 1942-46
	Apr. 12, 1947	Apr. 13, 1946		Apr. 12, 1947	Apr. 13, 1946		Apr. 12, 1947	Apr. 13, 1946		Apr. 12, 1947 [6]	Apr. 13, 1946	
NEW ENGLAND												
Maine	1	1	0	21	34	34	0	0	0	0	1	1
New Hampshire	0	0	0	9	8	8	0	0	0	0	0	0
Vermont	[7] 0	0	0	10	12	7	0	0	0	0	0	0
Massachusetts	0	0	0	115	202	450	0	0	0	6	1	1
Rhode Island	0	0	0	16	22	22	0	0	0	0	0	0
Connecticut	0	0	0	42	70	71	0	0	0	0	2	0
MIDDLE ATLANTIC												
New York	7	4	3	343	912	535	7	0	0	0	0	3
New Jersey	2	2	1	155	190	167	0	0	0	0	1	0
Pennsylvania	0	1	1	216	405	405	0	0	0	4	4	4
EAST NORTH CENTRAL												
Ohio	0	0	0	358	401	311	0	1	1	2	0	1
Indiana	0	1	0	71	83	115	1	1	1	2	0	1
Illinois	1	1	1	103	203	281	0	0	1	0	0	4
Michigan [3]	1	0	0	128	160	160	0	0	0	2	4	1
Wisconsin	0	0	0	39	134	168	0	0	0	1	3	0
WEST NORTH CENTRAL												
Minnesota	0	0	0	48	62	76	0	0	0	0	0	0
Iowa	0	1	0	40	50	57	0	0	0	1	0	0
Missouri	0	0	0	38	56	116	0	0	0	0	0	0
North Dakota	0	0	0	7	8	22	0	0	0	0	0	0
South Dakota	0	0	0	10	6	20	0	0	0	0	0	0
Nebraska	0	0	0	13	38	38	0	2	0	0	0	0
Kansas	0	1	0	43	72	82	0	0	0	0	0	0
SOUTH ATLANTIC												
Delaware	0	0	0	7	7	13	0	0	0	0	1	0
Maryland [3]	0	0	0	28	83	148	0	0	0	0	1	0
District of Columbia	0	0	0	8	24	24	0	0	0	0	1	0
Virginia	0	0	0	32	85	82	0	0	0	0	1	1
West Virginia	0	0	0	11	39	39	0	0	0	0	0	3
North Carolina	0	0	0	20	37	39	0	0	0	0	0	2
South Carolina	0	0	0	2	8	4	0	0	0	0	0	1
Georgia	0	0	0	14	8	17	0	0	0	1	1	2
Florida	2	2	0	13	3	8	0	0	0	1	1	1
EAST SOUTH CENTRAL												
Kentucky	3	0	0	26	19	45	0	0	0	2	2	4
Tennessee	1	0	0	42	25	38	0	0	0	0	1	1
Alabama	0	0	1	6	65	17	0	0	0	0	0	1
Mississippi [3]	1	1	0	4	4	10	1	0	0	0	3	2
WEST SOUTH CENTRAL												
Arkansas	0	1	0	5	5	6	0	0	1	0	0	1
Louisiana	0	2	0	4	7	8	0	0	0	4	3	4
Oklahoma	2	0	0	7	16	16	0	0	1	0	0	0
Texas	0	6	3	31	20	63	0	0	1	1	11	7
MOUNTAIN												
Montana	0	0	0	3	17	17	0	0	0	0	0	0
Idaho	0	0	0	7	12	28	0	0	0	0	1	0
Wyoming	0	0	0	2	7	22	0	0	0	0	0	0
Colorado	0	0	0	43	23	45	0	0	0	2	1	0
New Mexico	0	0	0	11	9	10	0	0	0	0	1	1
Arizona	0	0	0	11	13	13	0	0	0	0	2	2
Utah [3]	0	0	0	15	35	30	0	0	0	0	0	0
Nevada	0	0	0	0	0	3	0	0	0	0	0	0
PACIFIC												
Washington	1	1	1	28	30	44	0	8	0	0	0	0
Oregon	0	0	0	47	32	38	0	0	0	1	0	0
California	10	3	3	120	201	201	0	0	0	2	2	2
Total	32	28	20	2,381	3,071	4,483	9	12	12	32	40	59
15 weeks	[7] 734	574	378	40,604	52,463	59,767	77	149	184	641	683	834
Seasonal low week [5]	(11th) Mar. 15-21			(32d) Aug. 9-15			(35th) Aug. 30-Sept. 5			(11th) Mar. 15-21		
Total since low	[7] 109	108	76	67,290	91,034	98,520	131	225	301	156	208	217

[3] Period ended earlier than Saturday.
[5] Dates between which the approximate low week ends. The specific date will vary from year to year.
[6] Including paratyphoid fever reported separately as follows: Massachusetts 4 (salmonella infection); Ohio 2; Michigan 1; Louisiana 1; Colorado 1.
[7] Delayed report: Poliomyelitis, Vermont, week ended March 1, 1 case, included in cumulative totals only.

Telegraphic morbidity reports from State health officers for the week ended Apr. 12, 1947, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Whooping cough: Week ended— Apr. 12, 1947	Whooping cough: Week ended— Apr. 13, 1946	Whooping cough: Median 1942–46	Week ended Apr. 12, 1947: Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis, infectious	Rocky Mt. spotted fever	Tularemia	Typhus fever, endemic	Undulant fever
NEW ENGLAND											
Maine	19	17	17								1
New Hampshire		1									
Vermont	15	32	19								3
Massachusetts	124	111	127	1	3						2
Rhode Island	5	18	26								
Connecticut	36	45	45								8
MIDDLE ATLANTIC											
New York	115	163	219	4	4						3
New Jersey	129	124	124	1							2
Pennsylvania	163	111	161				1				
EAST NORTH CENTRAL											
Ohio	144	71	133								2
Indiana	48	35	35				2		1		
Illinois	54	75	75	2	1						10
Michigan [3]	148	93	93								6
Wisconsin	127	104	104								8
WEST NORTH CENTRAL											
Minnesota	23	9	10	2							
Iowa	10	11	16				2				10
Missouri	20		11								
North Dakota		6	6			1					
South Dakota	1		2								5
Nebraska	6		9								3
Kansas	18	15	28								3
SOUTH ATLANTIC											
Delaware	3		1								
Maryland [3]	58	19	45			1	1				1
District of Columbia	7	4	8								
Virginia	84	47	48			75					1
West Virginia	10	20	26								
North Carolina	13	92	95						1	1	
South Carolina	108	79	79	3	8					2	
Georgia	30	35	21		1				6	6	1
Florida	45	4	17	5						3	3
EAST SOUTH CENTRAL											
Kentucky	9	57	42								
Tennessee	25	31	20	2		3					1
Alabama	38	4	18							7	6
Mississippi [3]	5			5	2					3	2
WEST SOUTH CENTRAL											
Arkansas	17	7	8			5					
Louisiana	20		3	1					3	1	
Oklahoma	13	9	10	1					2		
Texas	583	182	213	10	168	31			1	13	12
MOUNTAIN											
Montana	1		4					1			
Idaho	10	6	3								
Wyoming		10	10								
Colorado	33	40	39								
New Mexico	21	2	7	2							
Arizona	12	14	26			30					
Utah [3]	6	34	31								
Nevada			3								
PACIFIC											
Washington	18	27	43								2
Oregon	10	19	18								
California	111	51	309	3			2				4
Total	2,528	1,814	2,551	42	187	146	8	1	14	36	99
Same week, 1946	1,814			45	261	92	7	4	17	38	73
Median, 1942–46	2,551			36	261	62	7	4	12	36	[9] 88
15 weeks: 1947	38,005			697	4,612	3,171	101	13	[8] 525	614	1,564
1946	27,212			562	4,252	1,547	119	10	294	692	1,134
Median, 1942–46	36,627			417	3,087	958	119	7	267	692	[9] 1,211

[3] Period ended earlier than Saturday.
[8] Includes delayed reports, Oklahoma, 17 cases.
[9] 2-year average, 1945–46.

Anthrax: New York 1 case. *Leprosy:* Louisiana 1 case.

WEEKLY REPORTS FROM CITIES [1]

City reports for week ended April 5, 1947

This table lists the reports from 89 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0		0	37	0	2	0	0	0	0	4
New Hampshire:												
Concord	0	0		0		0	0	0	1	0	0	
Vermont:												
Barre	0	0		0	9	0	0	0	0	0	0	4
Massachusetts:												
Boston	6	0		1	56	2	3	0	27	0	1	16
Fall River	0	0		0	2	0	0	0	1	0	0	6
Springfield	0	0	1	0	22	0	0	0	4	0	0	1
Rhode Island:												
Providence	1	0	1	2	98	0	1	0	5	0	0	13
Connecticut:												
Bridgeport	0	0		0	13	0	2	0	2	0	0	
Hartford	0	0	1	0	25	0	0	0	2	0	0	
New Haven	0	0	1	0	32	0	2	0	14	0	0	3
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0		1	1	0	11	0	6	0	0	3
New York	22	0	14	2	145	3	62	0	153	*0	2	56
Rochester	0	0		0	2	1	7	0	8	0	0	1
Syracuse	0	0		0		0	2	0	3	0	0	5
New Jersey:												
Camden	0	0		0		0	2	0	2	0	0	3
Newark	0	0	4	0	24	1	4	0	13	0	0	31
Trenton	0	0	7	0	15	0	4	0	3	0	0	6
Pennsylvania:												
Philadelphia	4	0	12	2	7	2	19	0	41	0	1	24
Pittsburgh	0	0	3	5	27	0	8	0	16	0	0	9
Reading	0	0		0		0	3	0	5	0	0	
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	1	0		3		4	7	0	10	0	0	1
Cleveland	1	0	17	3	202	3	18	0	25	0	0	23
Columbus	2	0	2	2	10	0	5	0	11	0	0	2
Indiana:												
Fort Wayne	0	0		0	15	1	2	0	5	0	0	
Indianapolis	1	0		3	1	0	3	0	17	0	0	2
South Bend	0	0		0	6	0	0	0	2	0	0	
Terre Haute	0	0		0		0	2	0	0	0	0	
Illinois:												
Chicago	4	1	11	2	9	1	58	0	29	0	1	18
Springfield	0	0		0		0	2	0	7	0	0	1
Michigan:												
Detroit	1	1	6	1	6	0	15	0	34	0	0	62
Flint	0	0		0	1	2	5	0	6	0	0	2
Grand Rapids	0	0		1	4	0	2	0	5	0	0	8
Wisconsin:												
Kenosha	0	0		0		0	0	0	1	0	0	1
Milwaukee	0	0	2	2	43	1	16	0	21	0	0	19
Racine	0	0		0		0	0	0	4	0	0	10
Superior	0	0		0		0	2	0	2	0	0	
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0		0	1	0	1	0	0	0	0	2
Minneapolis	0	0		0	2	0	9	0	3	0	0	3
St. Paul	0	0		1	65	0	5	0	4	0	0	1
Missouri:												
Kansas City	0	0	7	1	1	0	9	0	12	0	0	
St. Joseph	1	0		0		0	0	0	0	0	0	4
St. Louis	0	0	11	4	14	1	19	0	17	0	1	7

[1] In some instances the figures include nonresident cases.

* Delayed report: Smallpox, New York City, 4 cases, with 1 death, since March 1.

City reports for week ended April 5, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
WEST NORTH CENTRAL—continued												
Nebraska:												
Omaha	1	0		1		0	2	0	1	0	0	
Kansas:												
Topeka	0	0		0		0	0	0	6	0	0	
Wichita	0	0	2	1	1	0	5	0	1	0	0	
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0		0		0	1	0	2	0	0	2
Maryland:												
Baltimore	3	0	14	1	15	4	13	0	15	0	0	49
Cumberland	0	0	1	0		0	4	0	2	0	0	
Frederick	0	0		0		0	0	0	0	0	0	
District of Columbia:												
Washington	0	0		0	18	0	12	0	18	0	0	5
Virginia:												
Lynchburg	0	0		0		0	2	0	1	0	0	1
Richmond	0	0	1	1	65	1	5	0	2	0	0	8
Roanoke	0	0		0	7	0	0	0	9	0	0	
West Virginia:												
Charleston	0	0		0	1	0	0	0	8	0	0	
Wheeling	0	0		1	1	1	3	0	1	0	0	1
North Carolina:												
Raleigh	0	0		0	1	0	1	0	0	0	0	2
Wilmington	0	0		0	14	0	2	0	0	0	0	
Winston-Salem	0	0		0	25	0	2	0	4	0	0	
South Carolina:												
Charleston	0	0	137	0	11	0	1	0	1	0	0	
Georgia:												
Atlanta	0	0	69	6	10	0	3	0	2	0	0	2
Brunswick	0	0		0		0	0	0	0	0	0	
Savannah	0	0	31	1	12	0	2	0	0	0	0	1
Florida:												
Tampa	1	0	5	1	2	1	0	0	3	0	1	2
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	0	0	10	0	2	0	13	0	1	0	0	9
Nashville	0	0		2		0	1	0	8	0	0	3
Alabama:												
Birmingham	0	0	42	1	46	0	9	0	8	0	1	2
Mobile	0	0	11	1	31	1	1	0	1	0	0	3
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	143	3		0	5	0	0	0	0	
Louisiana:												
New Orleans	0	0	3	1	38	3	12	0	5	0	0	6
Shreveport	0	0		0		0	6	0	1	0	0	
Oklahoma:												
Oklahoma City	0	0	238	0	2	0	3	0	1	0	0	3
Texas:												
Dallas	1	0		0	44	0	4	0	3	0	0	7
Galveston	0	0		1		0	1	0	0	0	0	
Houston	2	0	1	3	1	0	10	0	4	0	0	
San Antonio	3	0	4	5	3	0	3	0	1	0	0	1
MOUNTAIN												
Montana:												
Billings	0	0		0		0	1	0	1	0	0	
Great Falls	1	0		0	60	0	0	0	2	0	0	
Helena	0	0		0	1	0	1	0	0	0	0	
Missoula	0	0	200	0		0	1	0	0	0	0	
Idaho:												
Boise	0	0		0	1	0	0	0	1	0	0	
Colorado:												
Denver	3	0	7	0	49	2	11	0	6	0	0	11
Pueblo	1	0		0		0	2	0	6	0	0	
Utah:												
Salt Lake City	0	0		1	4	0	0	0	6	0	0	

City reports for week ended April 5, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
PACIFIC												
Washington:												
Seattle	0	0		1	4	0	6	0	2	0	0	1
Spokane	0	0	4	0	15	0	2	0	2	0	0	7
Tacoma	0	0		0	1	0	0	0	1	0	0	6
California:												
Los Angeles	1	0	9	0	13	0	6	0	17	0	2	29
Sacramento	0	0	1	1	1	1	2	0	1	0	0	5
San Francisco	2	0	1	0	3	0	6	0	13	0	1	2
Total	63	2	1,034	69	1,397	36	476	0	658	0	11	519
Corresponding week, 1946[1]	81		42	17	13,220		325		1,301	5	18	533
Average 1942-46 *	68		92	[2] 25	[3] 7,193		[2] 386		697	1	13	719

[2] 3-year average, 1944-46.
[3] 5-year median, 1942-46.
*Exclusive of Oklahoma City.
Anthrax.—Cases: New York 1.
Dysentery, amebic.—Cases: New York 2; Chicago 2; Los Angeles 1.
Dysentery, bacillary.—Cases: Chicago 1; San Antonio 1; Los Angeles 1.
Dysentery, unspecified.—Cases: Cincinnati 1; San Antonio 2.
Tularemia.—Cases: New Orleans 4.
Typhus fever, endemic.—Cases: Washington, D. C., 1; Tampa 1; Mobile 1; Houston 2.

Rates (annual basis) per 100,000 population, by geographic groups, for the 89 cities in the preceding table (estimated population, 34,421,800)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza Case rates	Influenza Death rates	Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
New England	20.1	0.0	11.5	8.6	845	5.7	28.7	0.0	161	0.0	2.9	135
Middle Atlantic	12.0	0.0	18.5	4.6	102	3.2	56.5	0.0	116	0.0	1.4	64
East North Central	6.1	1.2	23.1	10.3	181	7.3	83.3	0.0	109	0.0	0.6	91
West North Central	4.0	0.0	40.2	16.1	169	2.0	100.6	0.0	88	0.0	2.0	34
South Atlantic	6.5	0.0	421.7	18.0	297	11.4	83.4	0.0	111	0.0	1.6	119
East South Central	0.0	0.0	371.8	23.6	466	5.9	141.6	0.0	106	0.0	5.9	100
West South Central	15.2	0.0	988.1	33.0	224	7.6	111.8	0.0	38	0.0	0.0	43
Mountain	30.7	0.0	1,644.1	7.9	913	15.9	127.1	0.0	175	0.0	0.0	87
Pacific	4.7	0.0	23.7	3.2	59	1.6	34.8	0.0	57	0.0	4.7	79
Total	9.6	0.3	157.1	10.5	212	5.5	72.3	0.0	105	0.0	1.7	79

PLAGUE INFECTION IN YAKIMA COUNTY, WASHINGTON

Plague infection was reported proved on April 11 in a pool of 91 fleas from 59 meadow mice, *Microtus* sp., collected on March 22 on the Antiaircraft Range, 12 miles east of Yakima, Yakima County, Washington.

SMALLPOX IN NEW YORK

During the period March 1–24, 4 cases of smallpox, with 1 death, were reported in New York City. The infection was introduced by a person arriving from Mexico on March 1. The patient was hospitalized on March 5 and died on March 10. Up to April 15 a total of 12 cases, with 2 deaths, had been reported in New York City and its environs.

Vigorous measures are being carried forward by the State and local health departments for the control of the outbreak, and it is not expected that it will reach epidemic proportions.

This is the first reported occurrence of smallpox in New York State since 1939, in which year 51 cases were reported, including 1 case in New York City. The upstate cases occurred in 3 separate outbreaks in as many counties, and in each instance the infection was introduced from outside the State.

DEATHS DURING WEEK ENDED APRIL 5, 1947

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Apr. 5, 1947	Corresponding week, 1946
Data for 92 large cities of the United States:		
Total deaths	10,010	8,905
Median for 3 prior years	9,005	
Total deaths, first 14 weeks of year	139,574	139,405
Deaths under 1 year of age	775	600
Median for 3 prior years	599	
Deaths under 1 year of age, first 14 weeks of year	11,139	8,327
Data from industrial insurance companies:		
Policies in force	67,318,051	67,196,295
Number of death claims	11,433	13,151
Death claims per 1,000 policies in force, annual rate	8.9	10.2
Death claims per 1,000 policies, first 14 weeks of year, annual rate	9.9	11.2

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended March 22, 1947.—During the week ended March 22, 1947, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox	----	21	----	218	322	18	17	61	74	731
Diphtheria	----	1	1	7	1	4	----	5	5	24
Dysentery:										
Amebic	----	----	----	----	1	----	----	----	----	1
Bacillary	----	----	----	2	----	----	----	----	1	3
German measles	----	1	----	59	68	1	6	3	11	149
Influenza	----	48	----	-	33	----	----	----	17	98
Measles	4	53	2	200	206	476	111	175	494	1,721
Meningitis, meningococcus	----	----	----	----	1	----	----	----	1	2
Mumps	----	13	1	75	901	51	129	22	197	1,389
Poliomyelitis	----	----	----	----	1	----	----	----	----	1
Scarlet fever	1	1	76	77	85	4	1	5	11	261
Tuberculosis (all forms)	----	6	1	103	27	21	12	28	137	335
Typhoid and paratyphoid fever	----	----	----	7	----	----	----	2	5	14
Undulant fever	----	----	----	1	3	----	----	----	2	6
Venereal diseases:										
Gonorrhea	1	29	11	158	74	48	20	33	67	441
Syphilis	1	7	9	83	76	9	7	9	45	246
Other forms	----	----	----	----	----	----	----	----	8	8
Whooping cough	----	3	1	22	78	14	1	12	40	171

JAMAICA

Notifiable diseases—4 weeks ended March 8, 1947.—During the 4 weeks ended March 8, 1947, cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Cerebrospinal meningitis	2	2	Leprosy	----	3
Chickenpox	3	5	Puerperal sepsis	----	1
Diphtheria	8	6	Tuberculosis, pulmonary	37	60
Dysentery, unspecified	----	6	Typhoid fever	8	58
Erysipelas	----	1	Typhus fever	2	4

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

Siam (Thailand).—For the week ended March 15, 1947, 148 cases of cholera with 72 deaths were reported in Siam (Thailand).

Plague

Brazil.—For the month of September 1946, 29 cases of plague with 6 deaths were reported in Brazil by States as follows: Bahia, 2 cases, 1 death; Ceara, 26 cases, 5 deaths; Parahyba, 1 case.

Peru.—Plague has been reported in Peru as follows: December 1–31, 1946, Libertad Department—city of Trujillo, 6 cases, 3 deaths, Veru, 1 case; February 1947, Libertad Department, Trujillo Province, 2 cases, 1 death; Lima Department, Chancay Province, 12 cases, 2 deaths; Piura Department, Huancabamba Province, 12 cases, 4 deaths.

Turkey (in Asia)—Akcakale.—For the week ended March 29, 1947, 2 cases of plague with 2 deaths were reported in Akcakale, Turkey.

Smallpox

Burma.—Smallpox has been reported in Burma as follows: Weeks ended—March 15, 1947, 165 cases, 89 deaths; March 22, 1947, 195 cases, 102 deaths; for the week ended March 22, 1947, 117 cases of smallpox with 61 deaths were reported in Rangoon, Burma.

Egypt—Alexandria.—For the week ended March 8, 1947, 36 cases of smallpox were reported in Alexandria, and for the week ended March 15, 1947, 30 cases were reported.

Great Britain.—During the week ended April 5, 1947, 1 case of smallpox was reported in Scunthorpe, Lincolnshire, and another case was reported in Doncaster. Both cases are stated to have been associated with contacts in Grimsby. Three other cases suspected of being smallpox were reported on March 5, March 23, and March 25, respectively, at Bilston, Staffordshire, England.

Indochina (French)—Cochinchina.—For the period March 11–20, 1947, 129 cases of smallpox with 88 deaths were reported in Cochinchina, French Indochina.

Ivory Coast.—For the period March 1–10, 1947, 133 cases of smallpox with 3 deaths were reported in Ivory Coast.

Libya—Tripoli.—For the week ended March 22, 1947, 178 cases of smallpox with 13 deaths, were reported in Tripoli, Libya.

Siam (Thailand).—For the week ended March 15, 1947, 90 cases of smallpox with 10 deaths were reported in Siam (Thailand).

FEDERAL SECURITY AGENCY

United States Public Health Service

Thomas Parran, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. St. J. Perrott, *Chief of Division*

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THE TECHNIQUES OF APPLICATION AND THE CONTROL OF ROACHES AND BEDBUGS WITH DDT [1]

By ROBERT L. STENBURG, *Assistant Engineer (R), United States Public Health Service*

Although it has not been definitely shown that roaches are significant vectors in the transmission of disease, their frequent occurrence in human habitations where they may contact food after encountering garbage and other filth renders it probable that diseases may be mechanically transmitted by these insects. Considerable evidence exists regarding the high toxicity of DDT to flies and mosquitoes, but there have been contradictory reports regarding its effectiveness against roaches. Therefore, additional information on this subject was deemed desirable.

On the basis of these considerations, some work was done to determine (1) the most effective techniques of applying DDT for roach control, and (2) the effectiveness of DDT against the German roach, *Blattella germanica* (Linn.), and the American roach, *Periplaneta americana* (Linn.).

The tests were in general designed to duplicate conditions encountered by the users of commercially distributed DDT. All experimental applications were made in operating establishments, such as houses, apartments, grocery stores, restaurants, meat markets, hotels, and hospitals. Five-percent-DDT liquid spray and 10-percent-DDT dusting powder were selected for most experimental treatments, since these concentrations now appear to be more or less standardized in commercial insecticides.

PROCEDURE

Sampling methods, trapping.—Inasmuch as a proper evaluation of DDT applications would depend on the accurate sampling of roach populations both before and after treatment, some method of counting was required. Trapping of roaches was initially selected as a method for determining the index of the infestation in any one locality. Small

[1] From Communicable Disease Center, Technical Development Division (Savannah, Ga.), States Relations Division

screen cages, 5 inches high and 4½ inches in diameter with funnel-shaped inlets, were used as traps. With a few bread crumbs inside to serve as bait, the cages were left overnight in drawers, cupboards, trunks, or boxes, and on tables or other localities where roaches existed. Although pretreatment trapping proved adequate for sampling certain localized infestations, this method of approximating roach populations was abandoned for the following reasons:

1. The cages trapped sufficient numbers of roaches to deplete the pretreatment populations. It was not deemed advisable to release the trapped roaches because of the adverse effect this would have had upon the householder, whose cooperation was essential, not to mention the possible effects the trapping might have had upon the behavior of the roaches themselves.

2. The traps proved to be unsatisfactory when populations were sparse. This became a consideration in posttreatment sampling because, ordinarily, populations were so reduced after treatment that in many cases no roaches entered the traps, even though a small degree of infestation still existed.

3. The selection of trapping sites was often difficult because the sphere of activity of German roaches appeared to be quite limited, and any one trap sampled only those roaches existing in a certain localized area, such as one section of a cupboard, one drawer, or perhaps a table. When a local infestation was completely eliminated by the treatment, infestations remaining in other parts of a room were not sampled by traps placed in pretreatment locations.

4. Unless cages were located so that they remained in semidarkness during daylight, the roaches escaped from the traps. This meant that infestations existing on tables and open shelves were not easily sampled.

Counting by inspection.—Since trapping did not prove satisfactory, a more direct method of approximating total populations was employed. Thorough inspections were made of cupboards, refrigerators, stoves, trunks, boxes, drawers, tables, chairs, and shelves; and every accessible crack and crevice was thoroughly examined with the aid of a flashlight. Occupants were questioned about any roaches they might have seen either during the day or at night, and while their reports were not entirely relied upon, they were nevertheless helpful to the inspector in locating remaining nests of roaches. On the basis of these infestation counts, premises were classified into one of the four following groups:

Class A.—No roaches in evidence according to weekly examinations by inspector and reports of occupants.

Class B.—Roaches do not constitute an obvious nuisance but are present. Weekly observations of inspector and reports of occupants show at least one, but less than five, roaches in any one room of a premise.

Class C.—Roaches are approaching nuisance stage. They are seen three or four at a time in cupboards, drawers, and tables. This classification includes premises showing more than 5 roaches, but less than 50, in any one room as reported by inspector.

Class D.—Roaches are definitely a nuisance and are too numerous to count in any one room of a premise.

These classifications were applicable to pretreatment and posttreatment populations but gave greater accuracy to posttreatment counts, which were usually in class C or better, whereas practically all pretreatment infestations were in class D. It is realized that this method could not account for every roach in a premise, but inspections were sufficiently thorough to insure locating those in the more obvious hiding places, and was considered entirely adequate for the purposes of this study.

In working out a satisfactory method of applying DDT to control roaches effectively, five general methods were investigated. During the treatment of all premises, every precaution was taken to keep DDT from getting onto dishes, cooking utensils, or uncovered food.

Method 1—Over-all spraying with 2½-percent DDT.—Several private houses were treated so as to duplicate the treatment used by the Malaria-Control-in-War-Areas (MCWA) program for mosquito control. This method consisted of spraying the ceilings and walls of an entire house with 2½-percent-DDT-xylene-Triton X-100 [2] emulsion to give a deposit of 100 mg. of DDT per square foot. In attempting to make this type of treatment more effective against roaches, additional spray was applied to the undersides of tables as well as to the insides of drawers, cupboards, and closets where roaches were in evidence. Many roaches were killed during the treatment and others continued to die in decreasing numbers for as long as 4 weeks after treatment. However, it was 2 or 3 weeks before class D infestations of German roaches were reduced to class C, and reduction beyond class C seldom occurred with this method. American-roach infestations dropped to class B in 3 weeks and to class A in 8 weeks.

Method 2—Over-all spraying with 5- and 10-percent DDT.—Another group of houses was sprayed in the manner described above, except that 5- and 10-percent concentrations of DDT-xylene emulsion were used to obtain 200 and 400 mg. of DDT per square foot, respectively. Roach mortalities resulting from these higher concentrations were approximately the same as those obtained with the 2½-percent spray, in that infestations were reduced considerably, but not as quickly nor as completely as seemed desirable. Class D infestations of German roaches were reduced to class C after 1 or 2 weeks, but there was no further reduction during the course of the study. Five-percent spray

[2] Manufactured by Rohm & Haas Co., Philadelphia, Pa.

applications reduced class D infestations of American roaches to class B in 3 weeks, whereas 10-percent spray reduced class D infestations of American roaches to class B in 1 week.

Method 3—Application of 10-percent-DDT dust to obvious resting places.—In a third group of houses only infested rooms were treated with 10-percent-DDT powder (90-percent powdered pyrophyllite), which was applied with a Getz [3] heavy-duty blower to cupboards, drawers, shelves, boxes, ledges, corners, and to all cracks around moulding, door frames, and window frames. These applications reduced the American-roach infestations to class A in 3 weeks. The number of German roaches was reduced greatly, but class D infestations did not drop to class C until 3 or 4 weeks after treatment.

These preliminary experiments made it apparent that over-all spraying of walls and ceilings with specific dosages of DDT or the application of 10-percent-DDT dust to the more obvious hiding places did not produce entirely satisfactory results. For example, American-roach infestations were reduced only from class D to class B in 1 to 3 weeks; whereas in the case of German roaches, 1 to 4 weeks was required to reduce a class D infestation to class C, and reduction beyond class C seldom occurred.

In most cases in which German roaches still existed in a premise 4 or more weeks after treatment, the remaining infestation occurred in a few localized spots which apparently had not received a thorough treatment. Further observations indicated that the dust applications were more effective against American roaches than against German roaches, partly because the former species seemed to travel greater distances and thus increased their chances of encountering the dust. German roaches appeared to move only short distances from their resting places and apparently always returned to approximately the same place.

Method 4—Combined use of 5-percent-DDT spray and 10-percent-DDT dust.—On the basis of the foregoing tests and observations, a treatment technique was adopted which attempted to apply heavier dosages of DDT (particularly in the form of 10-percent-DDT dust) to more concentrated areas, and especially to the daytime resting places of German roaches.

In a fourth series of tests, only infested rooms were treated with a combination of 5-percent-DDT liquid spray and 10-percent-DDT dust. This technique took advantage of the fact that roaches were driven from their resting places by xylene or other pungent DDT-spray solvents. All surfaces exhibiting cracks which might harbor roaches were sprayed. This included stoves, tables, chairs, refrigerators, cupboards, cabinets, shelves, sinks, trunks, and drawers. Most of

[3] Manufactured by Getz Exterminators, Inc., St. Louis, Mo.

the walls were treated thoroughly, particularly around window and door casings and around baseboards. Cracks in floors or floor coverings were treated when necessary. Ceilings were treated only if they had obvious cracks. As roaches emerged from hiding, their resting places were located, whereupon 10-percent-DDT dust was applied. Particular care was taken to dust every crack around sinks, and in tables, refrigerators and food cupboards. Shelves, cupboards, and drawers that could not be sprayed were dusted, and an application of dust was made under all furniture under which the floor was not regularly swept.

This technique produced excellent results in private houses and was therefore tried in commercial establishments, including restaurants, grocery stores, meat markets, hotels, and hospitals. In the majority of cases, infestations of German roaches were reduced from class D to class B within 1 week, the greatest mortality occurring within 3 or 4 days. Four weeks after treatment, class A conditions existed in two-thirds of the places treated, and the remainder were class B. In all but three cases, American-roach infestations were reduced from class D to class A or B within 1 week after treatment.

Method 5—Multiple spraying of infested areas.—An alternate method of applying larger dosages of DDT to more concentrated areas was tried, and although it was not as satisfactory as method 4, it is of interest because of the results obtained.

Infested rooms in a fifth group of houses were sprayed with 2½-, 5-, and 10-percent concentrations of DDT in a xylene-water emulsion. When an infestation was encountered, the locality of the infestation was sprayed three or four times, in order to kill as many of the emerging roaches as possible with the oil spray and, simultaneously, to leave a heavy deposit of DDT crystals on or near the resting place. This method gave better results than the controlled-dosage spraying, but was not as effective as the combination spray-and-dust method. The main objection to this type of treatment was the mess which resulted from drenching walls and furniture with DDT spray. It could be used only in very poor quality establishments.

GENERAL DISCUSSION AND SUGGESTIONS

Method 4, as described above, applied particularly to the treatment of private houses, and when other types of establishments were treated, certain variations in technique were found to be necessary. In the kitchens of restaurants, hotels, and hospitals where roaches were found mostly around sinks and shelves, or in tables and benches used for preparing and storing food, special care was taken to protect all food and dishes before spraying.

Infestations in hospital rooms usually resulted from food and crumbs being dropped by patients eating in bed. Heavy infestations existing in bedsprings were eliminated by repeated applications of 5-percent-DDT spray as described in method 5. This left a comparatively heavy deposit of DDT crystals on the bedsprings.

Infestations in hotel rooms were usually traced to food in the room and were eliminated by the treatment outlined under method 4.

Control of both species of roaches in grocery stores and meat markets required greater dependence on the 10-percent-DDT powder than on the liquid spray. Meat counters and cold-storage boxes were sprayed, but only dust was applied to shelves, cash registers, inside spools of wrapping paper, and wherever possible behind and under display cases. Ten-percent-DDT dust was also applied on and between packages and crates in storage rooms.

Special treatment was necessary in two cases in which American roaches entered houses from the outside, even after 10-percent-DDT dust had been applied to closets, under electric stoves and refrigerators, behind cupboard drawers, and in attics. These inside treatments only partially reduced the number of American roaches observed by the occupants at night. Therefore, an outside application of 5-percent-DDT spray was made to incinerators, garbage disposals, garages, and outside lavoratories. Wherever roaches were driven out of hiding by the spray, 10-percent-DDT dust was applied. Additional dust applications were made on the steps and porches, as well as to the ground immediately surrounding the houses. The following day, many dead roaches were counted as a result of this treatment, and the occupants did not report roaches inside the houses for the duration of the study.

RESULTS OF ROACH CONTROL

A complete summary of all tests made during this study is included in tables 1 and 2.

When over-all spraying of regulated dosages (100, 200, and 400 mg. of DDT per square foot) were applied to all rooms of infested houses as described in methods 1 and 2, several hundred German and American roaches, comprising class D infestations, were killed. Many roaches were not killed during these treatments, but some continued to die each day for about 2 weeks. In some cases dead German roaches were found for as long as 4 weeks after treatment. Infestations of American roaches were reduced to class A or class B, 3 or 4 weeks subsequent to treatment, and this control continued for the duration of the 16-week study. Class D German-roach infestations required from 1 to 3 weeks for reduction to class C, and seldom dropped below class C during the period of the study.

TABLE 1.—*Infestation classifications of American roaches before and after various methods of DDT treatment*

Test number[1]	Type of establishment	Type of DDT treatment	Extent of treatment	Classification of infestation: Before treatment	Time after treatment (in weeks): 1	2	3	4	8	12	16
1-1A	House	2½-percent spray	Entire house	D	C	C	B	B	A	A	A
2-1A	do	5-percent spray	do	D	C	C	B	B	A	A	A
2-2A	do	do	do	B	A	A	A	A	A	A	A
3-2A	do	10-percent dust	Kitchen and bedroom.	D	B	B	A	A	A	A	A
4-1A	Grocery store.	5-percent spray, 10-percent dust.	Store and stockroom.	D	B	B	B	B	A	A	A
4-2A	do	do	do	D	B	A	A	A	B	A	A
4-3A	do	do	do	D	C	C	C	C	B	A	A
4-5A	Meat market	do	do	D	A	A	A	A	A	A	A
4-6A	House	do	Kitchen	D	B	B	B	B	A	A	A
4-9A	do	do	do	C	A	A	A	A	A	A	A
4-10A	do	10-percent spray, 10-percent dust.	Kitchen and outside.	D	C	C	C	B	B	A	A
4-11A	do	do	Kitchen	C	A	A	A	A	A	A	A
4-12A	do	5-percent spray, 10-percent dust.	do	C	B	B	B	B	A	A	A
4-13A	do	do	do	C	B	A	A	A	A	A	A
4-14A	do	do	Entire house	D	B	B	A	A	A	A	A
4-15A	do	do	Kitchen and porch	D	B	B	B	B	A	A	A
4-16A	do	do	do	D	B	B	B	B	A	A	A
4-21A	do	do	Kitchen and outside.	D	C	B	A	A	A	A	A
4-22A	Hospital.	do	Entire building	D	B	A	A	A	A	A	A
4-23A	Restaurant.	do	Kitchen and storeroom.	D	A	A	A	A	A	A	A
4-24A	do	do	do	D	B	A	A	A	A	A	A
5-3A	House	5-percent spray	Kitchen	D	A	A	A	A	A	A	A
5-5A	do	do	do	D	A	A	A	A	A	A	A
5-7A	do	10-percent spray	do	D	A	A	A	A	A	A	A
5-8A	do	do	do	D	B	B	A	A	A	A	A

[1] First digit in this number refers to the method of treatment as numbered in the text.

TABLE 2.—*Infestation classifications of German roaches before and after various methods of DDT treatment*

Test number	Type of establishment	Type of treatment	Extent of treatment	Classification of infestation: Before treatment	Time after treatment (in weeks): 1	2	3	4	8	12	16
1-1	House	2½-percent spray	Entire house	D	D	D	C	C	C	C	C
1-2	do	do	do	D	D	C	C	C	C	C	C
1-3	do	do	do	D	D	C	C	C	C	C	C
2-1	do	5-percent spray	do	D	D	C	C	C	C	C	C
2-2	do	do	do	D	C	C	C	C	C	C	C
2-3	do	10-percent spray	do	D	C	C	C	C	C	C	C
3-1	do	10-percent dust	Kitchen and pantry.	D	D	D	C	C	C	C	C
3-2	do	do	Kitchen and bedroom.	D	D	D	D	C	C	C	C
4-1	Grocery store.	5-percent spray, 10-percent dust.	Store and stockroom.	D	C	B	B	B	A	A	A
4-2	do	do	do	D	C	C	C	B	B	A	A
4-3	do	do	do	D	C	B	B	A	A	A	A
4-4	do	do	do	C	B	A	A	A	A	A	A

TABLE 2.—*Infestation classifications of German roaches before and after various methods of DDT treatment*—Continued

Test number [1]	Type of establishment	Type of treatment	Extent of treatment	Classification of infestation							
				Before treatment	Time after treatment (in weeks)						
					1	2	3	4	8	12	16
4-5	Meat market.	5-percent spray, 10-percent dust.	Store and stockroom.	D	B	B	A	A	A	A	A
4-6	House	do	Kitchen	D	B	B	B	B	A	A	A
4-7	do	do	do	C	B	A	A	A	A	A	A
4-8	do	do	do	C	B	B	A	A	A	A	A
4-9	do	do	do	C	B	B	B	B	A	A	A
4-10	do	10-percent spray, 10-percent dust.	Kitchen and outside.	C	A	A	A	A	A	A	A
4-11	do	do	Kitchen	D	B	B	A	A	A	A	A
4-12	do	5-percent spray, 10-percent dust.	do	D	B	B	B	B	A	A	A
4-13	do	do	do	C	B	B	B	A	A	A	A
4-14	do	do	Entire house	C	B	B	A	A	A	A	A
4-15	do	do	Kitchen and porch	D	B	A	A	A	A	A	A
4-16	Apartment house.	do	do	D	B	A	A	A	A	A	A
4-17	do	do	Kitchen and pantry.	C	A	A	A	A	A	A	A
4-18	do	do	do	D	A	A	A	A	A	A	A
4-19	do	do	do	D	B	B	A	A	A	A	A
4-20	do	do	do	D	B	B	A	A	A	A	A
4-22	Hospital	do	Entire building	D	C	C	B	B	B	B	A
4-23	Restaurant.	do	Kitchen and stockroom.	D	B.	B	B	A	A	A	A
4-24	do	do	do	D	C	C	B	B	A	A	A
5-1	House	2½-percent spray	Kitchen	D	C	C	C	C	C	C	C
5-2	do	do	do	D	C	C	C	C	C	C	C
5-3	do	5-percent spray	do	D	B	B	B	B	B	B	B
5-4	do	do	do	D	B	A	A	A	A	A	A
5-5	do	do	do	D	C	C	C	B	B	B	B
5-6	do	10-percent spray	Entire house	D	C	B	A	A	A	A	A
5-7	do	do	Kitchen	D	C	C	C	C	C	C	C
5-8	do	do	do	D	B	B	B	B	A	A	A

Dusting of the more obvious roach resting places in infested rooms with 10-percent-DDT powder, as described in method 3, likewise resulted in a heavy mortality immediately after treatment. This method was particularly effective against American roaches, which were reduced from class D to class B in 1 week and often to class A in 3 weeks. The mortality of German roaches was also high immediately after treatment. Noticeable numbers of dead roaches were observed on the floors for about 3 weeks, at which time the infestation dropped from class D to class C. No further reduction in the classification of the German-roach infestation resulted during the course of the study.

In the combined use of 5-percent-DDT spray and 10-percent-DDT dust, as described in method 4, the greatest mortality of both species occurred immediately after treatment. Roaches continued to die for 3 or 4 days, but after 1 week very few dead roaches were seen. With few exceptions, class D infestations of German and American roaches in all types of establishments were reduced to class B or better in 1 week, and, in the majority of places treated, class A conditions existed within 4 weeks after treatment. No evidence of reinfestation of either species

was noted at any time during the study. The greater effectiveness which this method of treatment appeared to have over other methods tried, resulted chiefly from the fact that, insofar as possible, every nest of roaches was sought out and thoroughly dusted with 10-percent-DDT powder, whereas other methods of treatment relied to a great extent upon the roaches sooner or later passing over a locality having sufficient DDT to be toxic.

Repeated spraying of areas where roaches were encountered, as described in method 5, had the double advantage of killing many roaches with the DDT solvent as they emerged from hiding and simultaneously depositing heavier dosages of DDT crystals in the locality of the resting places. The results obtained using 2½-percent concentrations were not as satisfactory as those when 5- and 10-percent spray concentrations were used. With the two latter concentrations, some class D infestations of American roaches were reduced to class A in 1 week, whereas others required 3 weeks. German roaches were often reduced to class B or C infestations after 2 or 3 weeks. In general, the control which could be expected from this type of treatment was not as reliable as the combined use of spray and dust. Excellent results were obtained, however, in test No. 5–6 (table 2), in which an infestation of several thousand German roaches was reduced to class A 3 weeks after treatment. During the following 7 months no roaches were seen in this place by either occupant or inspector, although the type of housekeeping which permitted such an infestation to develop still existed.

In the two cases in which outside treatments were made in an effort to control American roaches which had been entering the houses at night, over 300 dead roaches were counted around the garages, incinerators, and garbage disposal units of each of the two premises. The treatment, which consisted of 5-percent-DDT spray applications followed by extensive dusting with 10-percent-DDT powder, apparently eliminated or greatly reduced the source of infestation, since no roaches were seen in either dwelling thereafter.

BEDBUG CONTROL

Eradication of bedbug infestations has been difficult in the past because some bedbugs would leave beds and furniture to hide in the cracks of walls and floors where they were not affected by the petroleum insecticides sprayed on the beds, mattresses, furniture, and wall surfaces.

DDT overcomes this difficulty because of its lasting toxicity, and many studies already conducted have shown that DDT is the most effective insecticide yet used against bedbugs (*1, 2, 3, 4, 5*).

In this study the extent and type of treatment was varied, different solvents were used, and various concentrations of DDT were applied, in an effort to determine the importance of these factors in bedbug control when DDT is used under practical conditions, i. e., by the householder. Observations were also made on the advantages or disadvantages in the use of various types of sprayers and nozzles.

All spray applications were made in dwellings in which bedbug counts had been made on mattresses, beds, and furniture prior to spraying. After spraying, inspections were made once each week for 16 weeks.

Procedure.—Premises were divided into groups, according to the extent of the DDT treatment applied in each house, as follows:

1. Mattresses were sprayed on both sides and around the edges. No other spraying was done in houses of this group.
2. Mattresses and bedsprings were sprayed.
3. Mattresses, bedsprings, and bedsteads were sprayed. Treatment of bedsteads consisted of spraying chiefly into cracks on the inside of sideboards, as well as into the joints where sideboards fasten to bed ends.
4. Entire beds, including mattresses, bedsprings, and bedsteads, were sprayed, as were the walls of the bedroom.
5. Walls and ceilings of the entire house were sprayed, together with all chairs, divans, and beds.

Sprayers and nozzles.—In the treatment of beds and mattresses, the 1-quart-capacity "Sure Shot Milwaukee" sprayer was tried, but the majority of spraying was done with the 4-gallon-capacity knapsack type of compressed-air sprayer. Use of the "Sure Shot" sprayer resulted in very little waste of spray, but considerable time was consumed in making the applications. The knapsack-type sprayer, equipped with an atomizing nozzle, producing a flat-fan spray pattern of approximately 50° and having a discharge rate of one-tenth gallon per minute at 40 pounds' pressure, appeared to be the most suitable for quick and thorough treatment of beds. With this nozzle, most surfaces could be given an even application of spray without getting them too wet and without excessive waste. Nozzles of the same type, having wider spray angles and higher discharge rates, left surfaces too wet and were found to result in excessive waste of spray.

RESULTS OF BEDBUG CONTROL

Actual counts of bedbugs made in all premises during this 16-week study are summarized in table 3. No bedbug reinfestations occurred during this period, although many of the places treated were immediately adjacent to infested houses in multiple-unit dwellings. In the

case of test No. 2–3 (table 3), two treated beds repeatedly showed no bedbugs, whereas inspections of a third untreated bed in the same house showed between 25 and 50 bedbugs each week, during the study.

TABLE 3.—*Bedbugs counted before and after treatment with various DDT sprays*

Test number	Extent of treatment	Solvent	Percent DDT	Number of bedbugs counted: Before treatment	After treatment (weeks): 1	8	16
1-1	Mattress	Xylene	2½	31	0	0	0
1-2	do	do	5	117	0	0	0
1-3	do	do	10	74	0	0	0
2-1	Mattress and bedsprings	do	2½	43	0	0	0
2-2	do	do	5	81	0	0	0
2-3	do	do	10	240	0	0	0
3-1	Mattress, bedsprings, and bedstead	do	2½	62	0	0	0
3-2	do	do	5	29	0	0	0
3-3	do	do	10	42	0	0	0
3-4	do	Kerosene deodorized	5	37	0	0	0
3-5	do	do	5	45	0	0	0
4-1	Entire bed and walls of bedroom	Xylene	2½	138	0	0	0
4-2	do	Velsicol AR-50 (regular).	2½	40	0	0	0
4-3	do						
4-4	do	Velsicol AR-50 (regular).	5	48	0	0	0
4-5	do	Velsicol AR-50 (special).	5	92	0	0	0
4-6	do	Solvesso No. 2	5	28	0	0	0
4-7	do	do	5	39	0	0	0
4-8	do	Xylene	10	46	0	0	0
4-9	do	do	10	28	0	0	0
4-10	do	Solvesso No. 2	10	83	0	0	0
4-11	do	do	10	27	0	0	0
4-12	do	Xylene	35	61	0	0	0
5-1	Beds, chairs, walls, and ceilings of entire house.	do	2½	52	0	0	0
5-2	do	PD-544C	2½	68	0	0	0
5-3	do	Velsicol AR-50 (regular).	2½	45	0	0	0
5-4	do	Solvesso No. 2	2½	36	0	0	0
5-5	do	Xylene	5	8	0	0	0
5-6	do	PD-544C	5	79	0	0	0
5-7	do	Velsicol AR-50 (regular).	5	38	0	0	0
5-8	do	do	5	26	0	0	0
5-9	do	do	5	42	0	0	0
5-10	do	Solvesso No. 2	5	30	0	0	0
5-11	do	Xylene	5	23	0	0	0

SUMMARY

In order to compare the effects of various methods of applying DDT for roach control, pretreatment and posttreatment infestations were classified into one of the four following groups:

A. No roaches evident.

B. One to five roaches per room in evidence.

C. Six to fifty roaches per room in evidence.

D. Roaches too numerous to count.

DDT has been used, with a relative degree of success, for controlling German and American roaches in a variety of establishments. Experi-

ments have been conducted wherein infestations of several hundred German and American roaches have been reduced to a negligible number within 1 week after treatment and further reduced after 4 weeks to a point at which, in many cases, no roaches were observed for the remainder of the 16-week study.

Against German roaches, the most satisfactory results have been obtained by the use of a DDT treatment technique involving the spraying of infested rooms with 5-percent-DDT spray, followed by a thorough application of 10-percent-DDT dust to every crack from which roaches were driven by the pungent spray. The successful use of this technique required a great deal of attention in the application of dust to cracks around sinks, and in refrigerators, food cupboards, chairs, tables, or benches where food was stored, prepared, or served.

Against American roaches, over-all dusting with 10-percent-DDT powder of obvious cracks around baseboards, window frames and door frames, as well as applications in cupboards, trunks, cabinets, and drawers, resulted in effective control of American roaches which were living inside the house. American roaches entering the house from the outside were effectively controlled, at least for the duration of this study, by treating the outside breeding places, such as incinerators, garages, and garbage-disposal places, with 5-percent-DDT spray and 10-percent-DDT dust, supplemented by dusting the ground immediately surrounding the house.

In general, it can be said that American roaches were more effectively controlled with lighter dosages of DDT spray, and less thorough applications of DDT dust, than were German roaches. This was attributed partly to the difference in habits of the two species, the German roach appearing to move only short distances from its resting place, whereas the American roach moves about considerably more and therefore has greater opportunity to encounter DDT in toxic doses.

DDT toxicity to bedbugs was investigated by treating groups of infested houses with various DDT sprays, using different solvents and in concentrations ranging from 2½ to 35 percent DDT.

Extent of DDT treatment ranged from spraying only the mattress, in the first group of houses, to spraying the entire house and furniture, in the fifth group.

All methods of treatment used resulted in complete control of bedbugs for the duration of the study.

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A NEW TECHNIQUE FOR SAMPLING THE DENSITY OF HOUSEFLY POPULATIONS [1]

By H. I. Scudder, *Senior Assistant Sanitarian (R), United States Public Health Service* [2]

The evaluation of insect control measures is dependent upon an adequate method of measuring the insect population or of estimating its importance. In the case of highly mobile insects such as houseflies, it is practically impossible to count all the individuals in even a small unit area. Moreover, houseflies are very gregarious, in the sense that large numbers often congregate in attractive spots, leaving the greater portion of the premise entirely free of flies. This characteristic is significant in that the usual small sample, if taken at random, results in a biased estimate of the mean of the population. The distribution of houseflies is often so extremely irregular, with only three or four peaks of population in an entire premise, that random samples are of very little value.

A common method of estimating the population of such mobile insects is the use of bait traps. In general, such traps have been unsatisfactory, first because it has been difficult to find baits of uniform and constant attractiveness, and secondly because the sphere of influence of a given bait will vary under different atmospheric conditions and in competition with counter-attractants of varying importance. Counting the number of flies resting on unit areas of walls or floors, collecting samples stuck on flypaper, and sweeping the air with regular insect nets have been tried; but none of these methods have met with the general approval of entomologists. A reasonable solution to this problem appears to be the use of a standard neutral resting surface that will neither repel nor actively attract the flies. By placing such a device at points where flies are concentrated, it should be possible to estimate the relative size of the population at such points.

In constructing a neutral resting surface, consideration has been given to the fact that houseflies are commonly observed to select

[1] From Communicable Disease Center, Technical Development Division (Savannah, Ga.), States Relations Division.

[2] Resigned December 1, 1946. Acknowledgment is made of the careful criticism and assistance of William M. Upholt, Entomologist, U. S. Public Health Service.

edges as resting places. Accordingly, a device known as a "fly grill" was constructed of ¼-inch strips cut from a ¾-inch board 3 feet long. These strips were left unplaned and were tacked ¾ inch apart on a rigid 3-piece frame to form a "fly grill" 1 yard square. Such a device contains a total of 147 linear feet of edge in the surface plane. Its open structure, moreover, allows the flies free movement through it and does not interfere with the natural attractiveness of the area in which it is placed. It has been suggested that the barred pattern of contrast formed by the structure may produce a positive optometer response in flies. There is no evidence available regarding this hypothesis other than that such a pattern does have a focus-shifting effect upon human vision. In any case, the device has an extremely high capacity for flies, as shown by figure 1, in which 485 flies may be counted resting on it at one time.

It will be noted in figure 1 that the fly grill has been divided into quadrants and that the strips have been tipped with black paint at alternate ends in groups of three. This permits easier counting of the flies when large numbers are present and is important because counts should be made quite rapidly in view of the frequent movement of individual flies.

The 3-foot fly grill is so large and conspicuous to use in restaurants and similar places that a small fly grill, 18 inches on each side, was used in such situations (fig. 2). It was constructed of thirty-four ¼-inch-square strips spaced ¼ inch apart. Its construction and use was similar in all other regards to the 3-foot fly grill. Since the two grills were used in entirely different situations, one size was never evaluated in terms of the other. Each appeared to have a satisfactory capacity in the situation for which it was designed.

As indicated above, random placement of the fly grill in most natural fly populations would result in a great many zero counts, with the possibility of no large counts unless a large number of placements were used in each sampling. Accordingly, it was decided to use the fly grill to determine the size of obvious peaks of population. The procedure used was rather simple. The inspector first observed the fly concentrations and selected the points of maximum fly annoyance. The fly grill was then placed in the center of each such concentration. With as little motion as possible, all flies resting at the edges of the area of concentration were disturbed to redistribute them and give them an opportunity of alighting on the fly grill. As their number rapidly stabilized within half a minute, the flies were counted rapidly about 30 seconds later. The number of flies counted was used as an approximate density value for each point chosen by the inspector.

During the first season in which the fly grill was used, as many as five counts were made at each grill placement, gently disturbing the

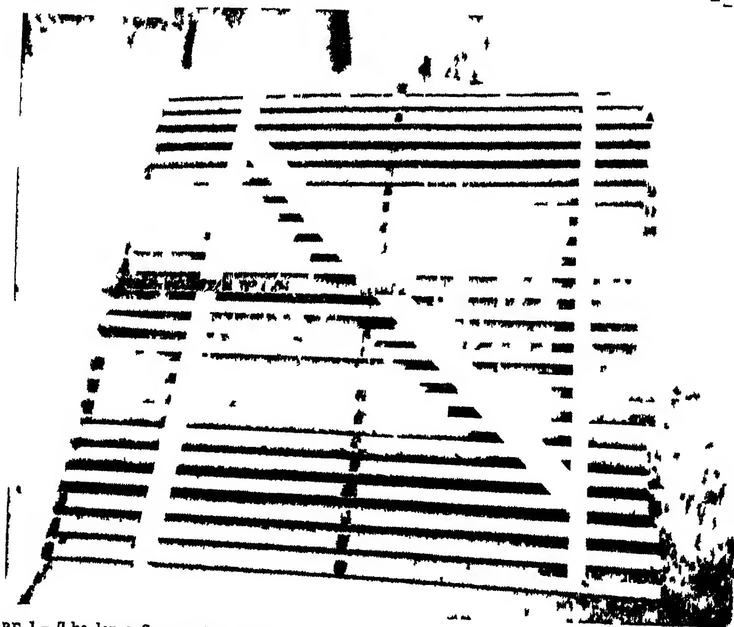

FIGURE 1.—The large fly counting grill in use in a dairy barn. Its division into quadrants facilitated making high counts under such heavily infested conditions as prevail here. There are 185 house flies resting on the grill.

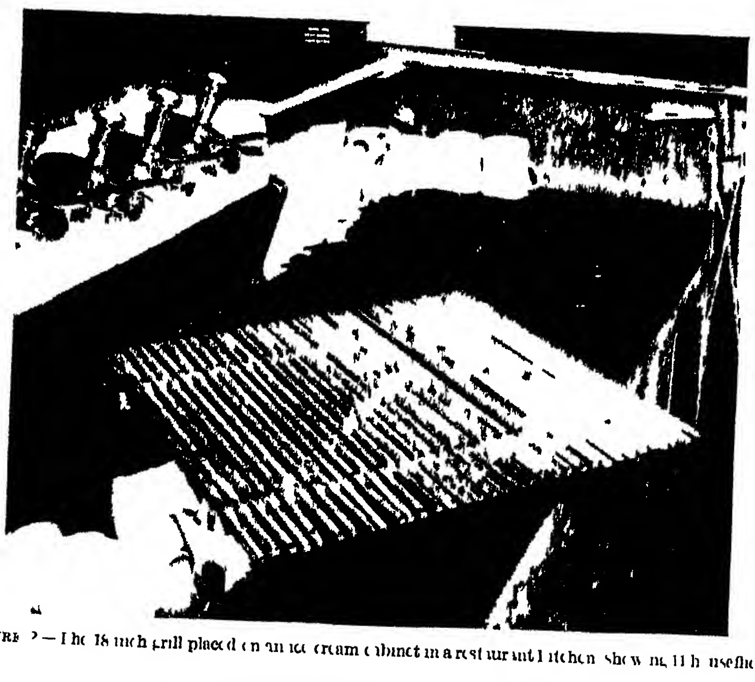

FIGURE 2.—The 18-inch grill placed on an ice cream cabinet in a restaurant kitchen showing 11 house flies.

flies and allowing them to come to rest again between each successive count. The highest count so obtained was considered the pertinent value for that particular placement. In general, the second count made at any point was the highest, though the counts of houseflies did not vary appreciably until after the fourth or fifth count. On the other hand, there was great variation from one point to another, the points with obviously more flies always yielding the highest counts.

The fly grill was placed as nearly as possible on the same level as the field of activity of the flies and in the center of their concentration. It was rarely necessary to stand the fly grill at an angle, as the horizontal position was usually nearer the level at which the flies were resting or actively moving about. The fly grill was placed in position carefully, so that the flies were not driven from the general area by the action. Houseflies are very persistent in returning to a location, so that moderate caution was sufficient in handling them; but blowflies (Calliphoridae) are more active and required far greater care.

In the case of establishments such as dairies, restaurants, etc., the entire establishment was arbitrarily divided into zones of a natural type, such as those shown in table 1, and counts were made at one or more locations in each such zone. Extreme midday heat seemed to disperse the flies from their normal outdoor pattern, making it necessary at times to discontinue sampling city blocks under such conditions.

The problem of the proper statistical techniques to apply to these fly-grill counts is as yet unsolved. Since counts are not made at random but rather are selected at peak concentrations, each figure is a maximum and cannot be averaged with the others to provide an estimate of the mean population. Probably the most suitable statistical method is to use a function of both the number of maxima found in the establishment and the size of each count. Not knowing the exact relationship between these counts and the total number of flies, the particular function to be used must be determined empirically. As a preliminary index for use in food-handling establishments, such as dairies, abbatoirs, restaurants, etc., a constant number (usually 4 or 5) of the highest counts were selected (with not more than one from a single zone), and the arithmetic mean of these maxima was recorded as the index for the establishment (see table 1). In the case

TABLE 1.—*An example of grill-count figures of housefly density and the present mode of index computation for dairies*

[Dairy (large grill counts)]

Sampling zone	Highest single zone count [1]	Sampling zone	Highest single zone count [1]
Barn entrances	*80	Milk room	14
Stanchions	*18	Entrance of milk room	8
Floor of barn	*20	Feed room	*22

[1] Average of starred (*) maxima=35, the fly index figure for the inspection.

of fly control on a city-wide basis, individual blocks were handled in the same manner; the mean from a constant number of counts in a given block was used as an index for that area of the city. The usual method of employing indices in control operations either in individual establishments or in entire municipalities was to institute further control measures as soon as the index for the establishment or for the city block exceeded an arbitrary figure such as 10.

This index appeared to have some practical justification. Thus, table 2 shows the range of values obtained in establishments rated

TABLE 2.—*The midsummer relationship between housefly index figures based on the grill technique and the general level of premise sanitation (Savannah, Ga.). (No comparison between large and small grills is intended)*

Sanitation level (untreated premises)	Dairies (large grill index)	Restaurants [1] (small grill index)
Good	Less than 20	Less than 3.
Average	20–60	3–5.
Poor	60–150	5–10.
Extremely poor	Over 150	Over 10.

[1] A clean restaurant or shop with an open front (short order) may have an index figure over 5, since the flies have such free access to it from the street.

independently for general level of sanitation. The indices determined by fly-grill counts are in agreement with the commonly observed fact that relatively large fly populations are associated with poor sanitation.

Figure 3 presents graphically the grill indices obtained in certain Texas cities [3] during 1946 and shows the very high peak of fly abundance associated with the peak of the tomato-canning activities in late June. All the cities were similar in size, population, industrial activities, and geographical conditions. Again, the indices are in agreement with the easily observed fact that the fluctuations in fly population were similar in all the cities, gradually building up to an extremely high peak in late June, after which the population declined very rapidly, building up again slightly in the cooler weather of the late fall months.

A third example of the results to be expected from the use of the fly-grill counts is presented in table 3.[4] The indices averaged over monthly periods indicate clearly the gradual increase in fly abundance at the dairy in question up to June 20. At that time, the dairy was sprayed, and, as indicated by the indices, the flies were kept under control at least through October. Figure 4 [4] presents similar evidence graphically.

[3] These data obtained on the Dysentery Control Project at Pharr, Texas, were kindly furnished by Dr. Dale R. Lindsay, Senior Assistant Sanitarian (R) of the U. S. Public Health Service.

[4] Data from Baker, Walter C.; Scudder, H. I.; and Guy, E. L.: The control of houseflies by DDT sprays. Pub. Health Rep., 62: 597–612 (Apr. 25, 1947).

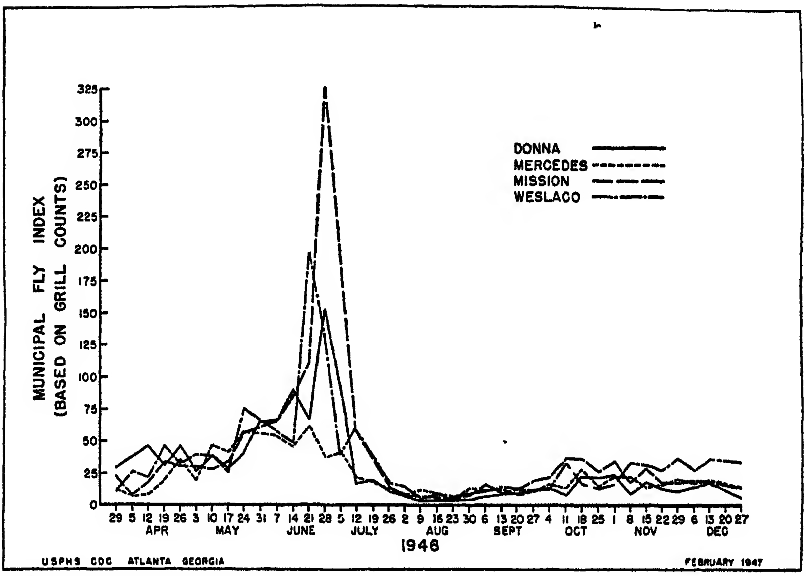

FIGURE 3.—A graph of municipal fly indices showing the seasonal trend in four similar towns in Hidalgo County, Tex.

TABLE 3.—*Housefly index figures computed from large grill counts made at a large dairy before and after spraying with DDT (data from Baker, et al.)*

Pretreatment fly index			Posttreatment fly index		
Date—1945	Index	Monthly index average	Date—1945	Index	Monthly index average
Apr. 4	7		June 26	11	--------
Apr. 10	23	20.5	July 3	4.50	
Apr. 18	15		July 9	0.75	
Apr. 24	37		July 16	3.75	5.9
May 5	76		July 23	7.50	
May 7	74		July 30	13.00	
May 14	133	93.4	Aug. 6	3.75	
May 21	76		Aug. 13	4.25	3.6
May 28	108		Aug. 21	5.25	
June 4	188		Aug. 27	1.00	
June 11	250	199.7	Sept. 7	5.25	
June 18	161		Sept. 12	7.25	6.2
			Sept. 18	8.25	
			Sept. 25	4.00	
			Oct. 3	8.25	
			Oct. 9	10.50	
Dairy sprayed June 20, 1945			Oct. 18	1.75	5.1
			Oct. 23	3.00	
			Oct. 30	1.75	

This technique of estimating fly populations was designed for use with the housefly, *Musca domestica* L. It has also been used successfully to estimate blowfly (Calliphoridae) populations.[5] The Calliphorids are far more active than houseflies and, unlike them, tend to rest only briefly on neutral surfaces. In using the fly grill, there-

[5] Baker, W. C., and Schwartz, L. G.: Preliminary studies on the control of blowflies with DDT. Pub. Health Rep. (in press).

fore, these flies had to be counted rapidly before they moved downward through the grill to rest again upon the food from which they were disturbed.

The fly grill as described has been used as a standard counting surface for estimating peaks of fly populations from which index

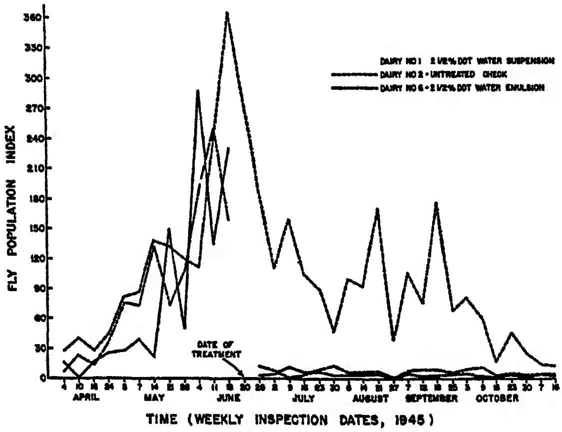

FIGURE 4.—Comparison of the grill indices of housefly density in three dairies, two of which were treated with DDT sprays (Savannah, Ga.).

figures can be computed for use in guiding fly-control programs in single establishments or in entire municipalities. Direct observations in the field by experienced sanitarians supported the validity of the method, which was found to be quite simple in application and economically feasible. Since statistical analysis of the data is dependent upon further studies of insect distributions and non-random samples, it is not yet possible to validate the method or the index used on other than its present empirical basis. In general, the method has found favor with both entomologists and sanitarians who have seen it demonstrated and actually used it themselves under a variety of conditions.

DEATHS DURING WEEK ENDED APRIL 12, 1947

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Apr. 12, 1947	Corresponding week, 1946
Data for 93 large cities of the United States:		
Total deaths	10,154	9,105
Median for 3 prior years	9,154	
Total deaths, first 15 weeks of year	151,812	150,718
Deaths under 1 year of age	723	596
Median for 3 prior years	599	
Deaths under 1 year of age, first 15 weeks of year	12,075	9,079
Data from industrial insurance companies:		
Policies in force	67,308,805	67,201,289
Number of death claims	12,738	13,322
Death claims per 1,000 policies in force, annual rate	9.9	10.3
Death claims per 1,000 policies, first 15 weeks of year, annual rate	9.9	11.2

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED APRIL 19, 1947

Summary

The reported incidence of influenza again declined sharply during the week. A total of 12,616 cases was reported, as compared with 23,536 last week. The current figure, however, is still high above the 5-year (1942–46) median of 1,815 cases. Only 9 States reported more than 164 cases each, and only 2 of these, Georgia and Alabama, showed increases. The 9 States are as follows (last week's figures in parentheses): Virginia 3,242 (4,673), West Virginia 202 (935), South Carolina 2,151 (2,650), Georgia 791 (485), Tennessee 406 (741), Alabama 1,366 (727), Arkansas 538 (1,255), Oklahoma 717 (3,347), Texas 1,774 (3,896). Of the total for the year to date, 278,753 cases (as compared with a 5-year median of 69,295), 238,162 or 85 percent, occurred during the past 7 weeks. The respective corresponding percentages for 1946, 1945, and 1944 are 11, 30, and 6 percent. Thirteen States with reports of more than 2,534 cases each during the 7-week period since March 1 and an aggregate of 220,900 cases, or approximately 93 percent of the total for the period, are as follows: Wisconsin 3,266, Iowa 15,109, Kansas 14,294, Virginia 19,164, West Virginia 12,435, South Carolina 13,951, Georgia 4,734, Tennessee 4,509, Alabama 7,647, Arkansas 22,653, Oklahoma 22,216, Texas 75,384, Colorado 5,538. The total since the last week of July, the approximate average date of seasonal low weekly incidence, is 311,728, as compared with 542,880 for the 1945–46 period, and a 5-year median of 105,157.

Of 10 cases of smallpox reported for the week, 4 occurred in Texas, 2 in Oklahoma, and 1 each in New Jersey, Indiana (last week 1), Mississippi (last week 1), and Nebraska. Through April 22 a total of 12 cases of smallpox, with 2 deaths, has been reported in New York City and its environs. (See p. 693).

The total of poliomyelitis reported since March 15, the average week of lowest seasonal incidence, is 141, as compared with 137 for the same period last year and a 5-year median of 99.

Deaths recorded for the week in 93 large cities of the United States totaled 9,701, as compared with 10,154 last week, 9,082 and 9,109, respectively, for the corresponding weeks of 1946 and 1945, and a 3-year (1944–46) median of 9,109. The cumulative total is 161,153, as compared with 159,800 for the corresponding period last year.

Telegraphic morbidity reports from State health officers for the week ended April 19, 1947, and comparison with corresponding week of 1946 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median, 1942-46	Week ended—		Median, 1942-46	Week ended—		Median, 1942-46	Week ended—		Median, 1942-46
	Apr. 19, 1947	Apr. 20, 1946		Apr. 19, 1947	Apr. 20, 1946		Apr. 19, 1947	Apr. 20, 1946		Apr. 19, 1947	Apr. 20, 1946	
NEW ENGLAND												
Maine	2	1	1	8	-------	-------	184	64	64	0	0	3
New Hampshire	0	0	0	16	-------	-------	18	78	23	1	1	1
Vermont	0	0	0	-------	-------	-------	281	3	118	0	1	0
Massachusetts	7	3	2	-------	-------	-------	461	1,607	1,187	0	3	7
Rhode Island	1	0	1	3	-------	1	357	9	24	3	0	0
Connecticut	0	3	2	8	-------	-------	758	283	447	2	3	3
MIDDLE ATLANTIC												
New York	23	25	20	[1] 4	(1)	[1] 2	447	5,386	2,314	6	10	32
New Jersey	5	13	5	14	3	5	391	3,466	1,545	2	3	5
Pennsylvania [2]	11	26	8	-------	-------	1	204	4,225	1,419	4	14	14
EAST NORTH CENTRAL												
Ohio	2	17	8	27	1	8	879	754	754	5	5	6
Indiana	3	4	5	17	4	6	97	563	256	3	1	2
Illinois	1	5	8	23	1	6	104	808	808	2	6	11
Michigan [3]	5	8	7	13	2	2	43	1,769	944	2	5	6
Wisconsin	0	1	1	106	57	37	295	4,566	1,620	0	4	4
WEST NORTH CENTRAL												
Minnesota	7	13	4	2	-------	1	188	30	285	4	0	1
Iowa	1	3	3	159	-------	2	202	205	205	3	1	1
Missouri	2	7	2	4	2	2	36	331	375	3	6	9
North Dakota	0	1	1	7	-------	7	5	9	70	0	0	0
South Dakota	4	1	1	-------	-------	-------	42	24	19	0	1	0
Nebraska	3	1	2	31	-------	2	-------	376	198	0	0	1
Kansas	7	0	2	60	-------	3	10	700	576	0	1	
SOUTH ATLANTIC												
Delaware	1	0	0	2	-------	-------	1	66	15	1	0	0
Maryland [3]	2	22	9	13	4	3	28	499	499	5	2	5
District of Columbia	0	3	1	-------	-------	2	24	269	112	2	1	2
Virginia	5	5	5	3,242	159	159	232	430	425	5	8	8
West Virginia	1	9	3	202	5	11	65	67	176	1	1	2
North Carolina	12	7	7	-------	-------	6	159	498	498	4	1	4
South Carolina	10	3	3	2,151	229	265	256	341	341	1	0	0
Georgia	5	0	4	791	1	7	181	160	160	0	0	2
Florida	2	9	6	125	2	2	144	179	171	3	0	5
EAST SOUTH CENTRAL												
Kentucky	4	4	4	13	9	9	15	227	198	4	5	5
Tennessee	2	7	3	406	17	40	80	238	219	2	3	12
Alabama	1	2	4	1,366	18	95	354	266	266	0	1	8
Mississippi [3]	6	3	5	132	-------	-------	24	-------	-------	2	1	3
WEST SOUTH CENTRAL												
Arkansas	5	8	4	538	33	33	75	178	178	4	1	1
Louisiana	2	9	2	29	4	2	225	51	116	2	3	4
Oklahoma	0	2	3	717	24	45	5	483	306	1	2	2
Texas	16	32	28	1,774	595	593	329	2,005	1,974	7	2	3
MOUNTAIN												
Montana	0	0	1	51	1	2	164	64	132	0	0	0
Idaho	0	1	1	46	22	1	6	121	87	0	1	1
Wyoming	0	0	0	-------	-------	-------	11	102	100	0	0	0
Colorado	7	8	7	88	6	19	77	1,318	511	0	1	1
New Mexico	0	1	1	3	2	2	63	71	71	0	0	0
Arizona	1	5	2	164	40	57	-------	236	145	1	0	0
Utah [3]	1	0	0	86	1	2	10	465	319	0	0	0
Nevada	0	0	0	-------	-------	-------	2	10	1	0	0	0
PACIFIC												
Washington	0	2	2	32	-------	2	15	615	393	1	1	5
Oregon	3	4	2	112	23	17	24	371	165	6	2	2
California	14	18	18	31	46	46	189	3,374	3,374	5	11	23
Total	184	296	201	12,616	1,311	1,815	7,710	37,960	25,362	97	112	190
16 weeks [3]	4,432	5,864	4,687	278,753	180,632	69,295	90,810	339,156	288,308	1,425	2,949	3,807
Seasonal low week [4]	(27th) July 5-11			(30th) July 26-Aug. 1			(35th) Aug. 30-Sept. 5			(37th) Sept. 13-19		
Total since low [3]	11,998	17,508	13,412	311,728	542,880	105,157	113,697	365,280	326,321	2,397	4,453	6,259

[1] New York City only.

[2] Pennsylvania reports for week ended April 5: Cerebrospinal meningitis, 6; diphtheria, 17; measles, 182; poliomyelitis, 1; scarlet fever, 200; typhoid fever, 1; undulant fever, 1; whooping cough, 174; these figures are included in cumulative totals only.

[3] Period ended earlier than Saturday.

[4] Dates between which the approximate low week ends. The specific date will vary from year to year.

Telegraphic morbidity reports from State health officers for the week ended April 19, 1947, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46
	Apr. 19, 1947	Apr. 20, 1946		Apr. 19, 1947	Apr. 20, 1946		Apr. 19, 1947	Apr. 20, 1946		Apr. 19, 1947[5]	Apr. 20, 1946	
NEW ENGLAND												
Maine	0	0	0	26	36	36	0	0	0	1	1	1
New Hampshire	1	0	0	10	19	13	0	0	0	3	0	0
Vermont	0	0	0	5	12	12	0	0	0	0	0	0
Massachusetts	0	0	0	126	157	386	0	0	0	4	1	2
Rhode Island	0	0	0	6	12	25	0	0	0	0	0	0
Connecticut	0	0	0	46	47	72	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York	3	5	3	242	855	643	[6] 1	0	0	1	4	5
New Jersey	1	0	0	84	147	147	1	0	0	1	1	1
Pennsylvania [3]	0	0	0	185	519	519	0	0	0	0	2	6
EAST NORTH CENTRAL												
Ohio	0	2	0	234	373	341	0	0	0	0	0	2
Indiana	0	0	0	100	91	102	1	0	0	2	3	0
Illinois	3	1	1	118	172	204	0	0	0	0	2	2
Michigan [3]	2	0	0	93	202	288	0	0	0	0	4	3
Wisconsin	0	0	0	69	128	176	0	1	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	1	0	0	42	38	63	0	0	0	0	0	0
Iowa	1	1	0	30	56	56	0	0	0	2	2	1
Missouri	1	0	0	32	92	92	0	0	0	0	0	2
North Dakota	0	0	0	2	9	18	0	0	0	0	0	0
South Dakota	0	0	0	1	7	20	0	0	0	0	0	0
Nebraska	1	0	0	36	10	36	1	0	0	0	0	0
Kansas	0	0	0	36	64	65	0	0	0	0	1	1
SOUTH ATLANTIC												
Delaware	1	0	0	3	12	12	0	0	0	0	0	0
Maryland [3]	0	0	0	37	82	82	0	0	0	1	0	1
District of Columbia	0	0	0	7	38	36	0	0	0	0	4	0
Virginia	0	0	0	47	90	90	0	0	0	2	3	1
West Virginia	0	0	0	14	25	31	0	0	0	1	0	3
North Carolina	0	0	0	17	22	38	0	0	0	0	1	1
South Carolina	0	0	0	5	6	6	0	0	0	2	0	0
Georgia	0	0	0	11	12	11	0	0	0	1	3	5
Florida	2	6	1	8	10	8	0	0	0	0	3	3
EAST SOUTH CENTRAL												
Kentucky	0	0	1	23	26	49	0	1	0	2	2	1
Tennessee	0	0	0	32	17	58	0	0	0	2	2	2
Alabama	0	1	1	18	2	12	0	0	0	3	1	1
Mississippi [3]	1	0	1	4	3	9	1	0	0	0	2	2
WEST SOUTH CENTRAL												
Arkansas	1	0	0	6	9	4	0	0	0	1	2	1
Louisiana	2	1	0	8	7	8	0	0	0	2	8	4
Oklahoma	0	0	0	9	16	19	2	2	0	0	2	1
Texas	4	2	3	20	58	58	4	1	1	3	14	7
MOUNTAIN												
Montana	0	0	0	7	8	17	0	0	0	1	0	0
Idaho	0	0	0	5	3	28	0	0	0	0	0	0
Wyoming	0	0	0	2	5	9	0	0	0	0	0	0
Colorado	0	1	0	38	49	52	0	0	0	0	0	0
New Mexico	0	0	0	7	1	9	0	0	0	0	0	1
Arizona	0	0	0	9	10	10	0	0	0	1	0	0
Utah [3]	0	0	0	17	28	30	0	0	0	0	0	0
Nevada	0	0	0	2	0	0	0	0	0	0	0	0
PACIFIC												
Washington	2	3	0	45	28	35	0	4	0	0	2	0
Oregon	0	0	0	26	40	35	0	0	0	0	3	0
California	5	6	4	126	180	180	0	0	0	3	3	3
Total	32	29	26	2,076	3,833	4,031	10	9	12	39	76	76
16 weeks [2]	767	603	401	42,880	56,296	63,789	88	158	189	681	759	904
Seasonal low week [4]	(11th) Mar. 15–21			(32nd) Aug. 9–15			(35th) Aug. 30–Sept. 5			(11th) Mar. 15–21		
Total since low [2]	141	137	99	69,566	94,867	102,126	142	234	306	196	284	297

[2] For footnote 2, see p. 688. [3] Period ended earlier than Saturday.
[4] Dates between which the approximate low week ends. The specific date will vary from year to year.
[5] Including paratyphoid fever reported separately, as follows: Massachusetts 4 (salmonella infection); New Jersey 1; Georgia 1; Texas 2.
[6] In New York City, delayed reports for period April 5-9 included in cumulative total only. Onset of last reported case April 9.

Telegraphic morbidity reports from State health officers for the week ended April 19, 1947, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Whooping cough: Week ended— Apr. 19, 1947	Whooping cough: Week ended— Apr. 20, 1946	Whooping cough: Median 1942–46	Week ended April 19, 1947: Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis, infectious	Rocky Mt. spotted fever	Tularemia	Typhus fever, endemic	Undulant fever
NEW ENGLAND											
Maine	17	32	25	1							
New Hampshire	3	2	6								
Vermont	8	11	11								1
Massachusetts	109	78	85	1	1						
Rhode Island	7	34	16								
Connecticut	35	71	38								2
MIDDLE ATLANTIC											
New York	142	161	242	10	1					3	4
New Jersey	152	91	117								1
Pennsylvania [2]	128	104	190				1				2
EAST NORTH CENTRAL											
Ohio	133	67	99								
Indiana	83	21	21		1						1
Illinois	86	68	68	2					2		8
Michigan [2]	134	89	89	1	4						10
Wisconsin	129	80	81								2
WEST NORTH CENTRAL											
Minnesota	19	8	29	3							2
Iowa	21	16	16								7
Missouri	28	9	11						1		
North Dakota	1	1	1								
South Dakota			2								
Nebraska	20		2	1							1
Kansas	41	25	30								11
SOUTH ATLANTIC											
Delaware			1								
Maryland [3]	68	7	63			1					1
District of Columbia	7		9								
Virginia	53	37	59			74					4
West Virginia	35	41	26								
North Carolina	34	67	133		1					1	
South Carolina	135	61	61	14	7		1		2	1	2
Georgia	18	6	13	1	4				5	10	2
Florida	65	7	13							2	
EAST SOUTH CENTRAL											
Kentucky	24	34	36				1				
Tennessee	42	18	26			1		1	1		
Alabama	84	22	35						1		1
Mississippi [3]				8	16						1
WEST SOUTH CENTRAL											
Arkansas	27	12	12		1	1			2		
Louisiana	5	1	3						1	1	
Oklahoma	21	13	14						1		3
Texas	539	268	240	9	106	27				5	11
MOUNTAIN											
Montana	13	2	6								
Idaho	14	9	3								1
Wyoming	2	3	5								
Colorado	39	28	34		2			2			
New Mexico	10	5	12								
Arizona	19	28	21			15					
Utah [2]	2	39	39		1						2
Nevada											
PACIFIC											
Washington	34	68	50								1
Oregon	23	19	19								1
California	271	74	319	5	6		1				7
Total	2,880	1,837	2,621	56	211	119	4	3	16	23	89
Same week, 1946	1,837			46	267	60	12	4	10	45	115
Median, 1942–46	2,621			31	258	60	10	4	11	35	[7] 99
16 weeks: 1947 [2]	41,069			753	4,823	3,290	105	16	541	637	1,654
1946	29,049			608	4,519	1,607	131	14	304	737	1,249
Median, 1942–46	39,248			442	3,345	1,023	131	14	275	787	[7] 1,310

[2] For footnote 2, see p. 688.
[3] Period ended earlier than Saturday.
[7] 2-year average, 1945–46.

Anthrax: New York 1 case.
Leprosy: Texas 1 case.

WEEKLY REPORTS FROM CITIES[1]

City reports for week ended April 12, 1947

This table lists the reports from 86 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0	------	0	52	0	0	1	1	0	0	2
New Hampshire:												
Concord	0	0	------	0	------	0	0	0	0	0	0	------
Vermont:												
Barre	0	0	------	0	10	0	0	0	0	0	0	2
Massachusetts:												
Boston	6	0	------	1	39	0	22	0	22	0	1	26
Fall River	0	0	------	0	4	0	1	0	1	0	0	4
Springfield	0	0	------	0	5	0	0	0	4	0	0	7
Worcester	0	0	------	0	6	0	10	0	3	0	1	11
Rhode Island:												
Providence	1	0	------	0	150	0	5	0	14	0	0	5
Connecticut:												
Bridgeport	0	0	------	0	13	0	0	0	0	0	0	1
New Haven	0	0	1	0	64	0	3	0	9	0	0	12
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0	------	5	------	0	4	0	6	0	0	1
New York	11	0	18	0	244	2	91	4	141	4	0	76
Rochester	0	0	------	1	2	0	6	0	11	0	0	2
Syracuse	0	0	------	1	------	0	4	0	8	0	0	6
New Jersey:												
Camden	3	0	------	0	1	0	1	0	1	0	0	------
Newark	0	0	3	0	24	1	4	0	10	0	0	30
Trenton	0	0	3	0	9	0	3	0	3	0	0	2
Pennsylvania.												
Philadelphia	9	0	4	1	8	2	41	0	49	0	0	31
Pittsburgh	1	0	2	4	16	2	15	0	21	0	0	4
Reading	0	0	------	0	4	0	3	0	4	0	0	2
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	1	0	3	5	4	1	9	0	6	0	0	8
Cleveland	0	0	9	1	195	4	13	0	18	0	0	38
Columbus	1	0	4	4	47	0	7	0	15	0	0	8
Indiana:												
Fort Wayne	0	0	------	0	21	0	2	0	1	0	0	4
Indianapolis	0	0	------	2	5	1	6	0	14	0	0	33
South Bend	0	0	------	0	22	0	0	0	2	0	0	------
Terre Haute	0	0	------	0	------	0	3	0	1	0	0	1
Illinois:												
Chicago	0	0	5	2	16	12	50	0	31	0	0	21
Michigan:												
Detroit	3	1	3	0	5	0	15	0	35	0	1	59
Flint	0	0	------	0	------	0	11	0	0	0	0	------
Grand Rapids	0	0	------	0	------	0	1	0	0	0	0	2
Wisconsin.												
Kenosha	0	0	------	0	------	0	0	0	3	0	0	4
Milwaukee	0	0	2	2	23	0	2	0	8	0	0	29
Racine	0	0	------	0	1	0	0	0	10	0	0	8
Superior	0	0	------	0	------	0	1	0	0	0	0	------
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0	------	0	------	2	2	0	3	0	0	5
Minneapolis	1	0	------	1	4	1	7	0	14	0	0	2
St. Paul	0	0	------	0	77	1	10	0	0	0	0	14
Missouri:												
Kansas City	0	0	2	1	2	1	9	0	10	0	0	2
St. Joseph	0	0	------	0	------	0	0	0	0	0	0	------
St. Louis	2	0	5	1	5	1	12	0	15	0	0	15

[1] In some instances the figures include nonresident cases.

City reports for week ended April 12, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
Nebraska:												
Omaha	2	0	------	1	------	0	2	0	5	0	0	------
Kansas:												
Topeka	0	0	------	0	------	0	3	0	9	0	0	5
Wichita	0	0	------	0	1	0	3	0	4	0	0	------
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0	------	0	------	1	1	0	0	0	0	2
Maryland:												
Baltimore	9	1	3	1	4	3	11	0	11	0	0	54
Cumberland	0	0	------	0	------	0	1	0	1	0	0	------
Frederick	0	0	------	0	------	0	1	0	0	0	0	------
District of Columbia:												
Washington	0	0	------	0	44	2	0	0	8	0	0	7
Virginia:												
Lynchburg	0	0	------	0	------	0	1	0	0	0	0	2
Richmond	0	0	------	0	79	1	3	1	1	0	0	------
Roanoke	0	0	------	0	6	0	0	0	2	0	0	------
West Virginia:												
Charleston	0	0	------	0	------	0	0	0	0	0	0	------
Wheeling	0	0	------	0	------	0	4	0	0	0	0	4
North Carolina:												
Raleigh	0	0	------	0	2	0	1	0	0	0	0	4
Wilmington	0	0	------	0	12	0	1	0	0	0	0	------
Winston-Salem	0	0	------	0	14	0	4	0	1	0	0	------
South Carolina:												
Charleston	0	0	124	1	21	0	0	0	0	0	0	1
Georgia:												
Atlanta	0	0	17	3	9	0	3	0	5	0	0	1
Brunswick	0	0	------	0	------	0	0	0	0	0	0	------
Savannah	0	0	12	2	19	0	2	0	2	0	0	------
Florida:												
Tampa	0	0	------	0	4	0	3	0	3	0	0	6
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	0	0	6	3	1	0	9	0	3	0	0	8
Nashville	0	0	------	4	4	1	2	0	4	0	0	3
Alabama:												
Birmingham	0	0	28	0	32	1	1	0	0	0	0	------
Mobile	0	0	33	1	27	1	2	0	0	0	0	12
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	7		2	0	1	0	0	0	0	------
Louisiana:												
New Orleans	0	0	10	2	69	0	6	0	1	0	0	3
Shreveport	0	0	------	1	------	0	6	0	0	0	0	------
Oklakoma:												
Oklahoma City	0	0	50	1	------	0	3	0	2	0	0	------
Texas:												
Dallas	0	0	------	0	73	1	1	0	1	0	0	2
Galveston	0	0	------	0	------	0	2	0	0	0	0	------
Houston	4	0	------	0	1	0	6	0	0	0	0	2
San Antonio	0	1	2	0	15	0	3	0	3	0	0	4
MOUNTAIN												
Montana:												
Billings	0	0	------	0	1	0	2	0	1	0	0	------
Great Falls	0	0	------	0	49	0	0	0	0	0	0	------
Helena	0	0	------	0	------	0	0	0	0	0	0	------
Missoula	0	0	250	0	17	0	2	0	0	0	1	------
Colorado:												
Denver	7	0	2	0	31	0	5	0	19	0	1	6
Utah:												
Salt Lake City	0	0	1	0	6	0	4	0	6	0	0	4

City reports for week ended April 12, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
PACIFIC												
Washington:												
Seattle	0	0	------	0	4	1	5	0	0	0	0	8
Spokane	0	0	------	0	1	0	2	0	2	0	0	------
Tacoma	0	0	------	0	2	0	0	0	1	0	0	1
California:												
Los Angeles	6	0	2	0	2	2	2	4	30	0	0	11
Sacramento	2	0	------	0	2	1	2	0	2	0	0	5
San Francisco	1	0	4	0	7	3	7	0	12	0	1	1
Total	70	3	615	52	1,639	49	490	10	633	4	6	633
Corresponding week, 1946*	95	------	58	15	13,891	------	357	------	1,433	3	9	497
Average 1942–46*	67	------	82	[2] 24	[3] 7,001	------	[2] 373	------	1,671	1	13	737

[2] 3-year average, 1944–46.
[3] 5-year median, 1942–46.
*Exclusive of Oklahoma City.

Dysentery, amebic.—Cases: Boston 1; Buffalo 1; New York 2; Grand Rapids 1; Memphis 2; Los Angeles 1.
Dysentery, bacillary.—Cases: Worcester 1; Baltimore 1.
Dysentery, unspecified.—Cases: Cincinnati 3; San Antonio 5.
Leprosy.—Cases: New Orleans 2.
Typhus fever, endemic.—Cases: Mobile 1.

Rates (annual basis) per 100,000 population, by geographic groups, for the 86 cities in the preceding table (latest available estimated population, 34,275,100)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza Case rates	Influenza Death rates	Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
New England	20.0	0.0	2.9	2.9	982	0.0	117.4	2.9	155	0.0	5.7	200
Middle Atlantic	11.1	0.0	13.9	5.6	143	3.2	79.6	1.9	118	1.9	0.0	71
East North Central	3.1	0.6	15.9	9.8	208	11.0	73.6	0.0	88	0.0	0.6	132
West North Central	10.1	0.0	11.1	8.0	179	12.1	96.5	0.0	121	0.0	0.0	86
South Atlantic	14.7	1.6	255.0	11.4	350	11.4	58.8	1.6	56	0.0	0.0	132
East South Central	0.0	0.0	305.4	47.2	378	17.7	82.6	0.0	41	0.0	0.0	136
West South Central	10.2	2.5	175.3	10.2	406	2.5	71.1	0.0	18	0.0	0.0	28
Mountain	63.3	0.0	2,289.4	0.0	941	0.0	117.6	0.0	235	0.0	18.1	90
Pacific	14.2	0.0	9.5	0.0	28	11.1	28.5	6.3	74	0.0	1.6	41
Total	10.7	0.5	93.8	7.9	250	7.5	74.7	1.5	97	0.6	0.9	97

SMALLPOX IN THE UNITED STATES

As of April 22, Dr. Israel Weinstien, Health Commissioner of New York City, stated that there had been a total of 8 cases of smallpox, with 2 deaths, in New York City from March 1 to April 22, the latest occurrence being 5 cases between April 5 and 9. Up to April 22 there had been 4 cases reported upstate (in Millbrook), about 60 miles north of New York City, with origin in a contact with the New York City

infection. This makes a total of 12 cases and 2 deaths in New York City and its environs, instead of 13 cases and 3 deaths as previously stated, of which 1 fatal case was erroneously reported.

In addition to these cases, 1 fatal case of smallpox was reported in Camden, New Jersey, on April 17, onset on April 8, stated possibly to have been a contact with a New York City case. During the week ended April 19, cases of smallpox were reported in other States as follows: Texas 4, Oklahoma 2, Indiana, Mississippi, and Nebraska 1 each. During the preceding week, New York (7 cases), Mississippi, and Nebraska (1 each) were the only States which reported any cases.

TERRITORIES AND POSSESSIONS

Hawaii Territory

Plague (in rodents and ectoparasites).—Plague infection has been reported in Hamakua District, Island of Hawaii, T. H., as follows: Month of March 1947, in 1 rodent; March 20, 1947, in 1 pool of fleas in District 3C, Kapulena.

Panama Canal Zone

Notifiable diseases—February 1947.—During the month of February 1947, certain notifiable diseases were reported in the Panama Canal Zone and terminal cities as follows:

Disease	Residence [1]									
	Panama City		Colon		Canal Zone		Outside the Zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox	15		8		2		4		29	
Diphtheria	159		1		1		38		199	
Dysentery:										
Amebic	1				2		4		7	
Bacillary			1		5				6	
Malaria [2]	8		2		28		32	1	70	1
Measles	4				10		2		16	
Meningitis, meningococcus	1		1				1	1	3	1
Mumps					2				2	
Pneumonia		11		5	16	1		6	[3] 16	23
Poliomyelitis					1	1			1	1
Relapsing fever							1		1	
Tuberculosis		23		9	2	2		5	[3] 2	39
Typhoid fever			1				2		3	
Typhus fever							2		[4] 2	
Whooping cough					3				[3] 3	

[1] If place of infection is known, cases are so listed instead of by residence.
[2] 9 recurrent cases.
[3] In the Canal Zone only.
[4] During the latter part of February and first part of March 1947, 15 cases of typhus fever (murine type) occurred in the outskirts of Panama City.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended March 29, 1947.—During the week ended March 29, 1947, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		37	1	115	334	24	19	66	110	706
Diphtheria				13	6	2				21
Dysentery:										
Amebic					3					3
Bacillary				1	1				1	3
German measles				16	44	1	12	2	5	80
Influenza		24			60	2			10	96
Measles		65		74	76	345	100	72	439	1,171
Meningitis, meningococcus				1	2		1		1	5
Mumps		12		66	694	55	180	21	142	1,170
Poliomyelitis					1					1
Scarlet fever		3		64	85	8	2	2	6	170
Tuberculosis (all forms)		3	4	132	30	19	10	26	62	286
Typhoid and paratyphoid fever			1	19	4					24
Undulant fever				10	4					14
Venereal diseases:										
Gonorrhea	3	17	7	106	79	49	20	33	85	399
Syphilis	3	15	6	70	70	14	11	9	47	245
Other forms									2	2
Whooping cough		10		66	143	15	1	2	26	263

CUBA

Habana—Communicable diseases—5 weeks ended March 29, 1947.—During the 5 weeks ended March 29, 1947, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Chickenpox	21	1	Poliomyelitis	3	1
Diphtheria	21	1	Scarlet fever	1	
Malaria	5		Tuberculosis	8	4
Measles	23		Typhoid fever	14	1

Provinces—Notifiable diseases—5 weeks ended March 29, 1947.—During the 5 weeks ended March 29, 1947, cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana [1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer	7	20	16	10		22	75
Cerebrospinal meningitis					1		1
Chickenpox		21		1		1	23
Diphtheria		27	4	2		1	34
Hookworm disease		21		1			22
Leprosy		8				3	11
Malaria	1	5		1	4	23	34
Measles		32	2	6	1	6	47
Poliomyelitis	3	4		1		6	14
Scarlet fever		1	1				2
Tuberculosis	36	24	23	56	23	40	202
Typhoid fever	12	39	10	21	8	46	136
Whooping cough	1	6				1	8

[1] Includes the City of Habana.

MOROCCO (FRENCH)

Notifiable diseases—January 1947.—For the month of January 1947, cases of certain notifiable diseases were reported in French Morocco as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	4	Paratyphoid fever	5
Conjunctivitis and ophthalmia of the newborn	6,929	Poliomyelitis	1
Diphtheria	14	Puerperal infection	10
Dysentery:		Recurrent fever	11
Amebic	2,235	Scarlet fever	5
Bacillary	187	Smallpox	23
Leprosy	14	Tuberculosis, pulmonary	782
Measles, including German measles	387	Typhoid fever	56
Ophthalmia neonatorum	8,349	Typhus fever	39

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

Siam (Thailand).—Cholera has been reported in Siam (Thailand) as follows: Weeks ended—March 22, 1947, 108 cases, 66 deaths; March 29, 1947, 153 cases, 109 deaths.

Plague

China—Kiangsi Province.—According to information dated April 21, 1947, 2 cases of plague were reported in Kiukiang, Kiangsi Province, China. It is also stated that cases of plague in Nanchang are rapidly increasing.

Syria—Euphrates Province—Wasta.—On April 11, 1947, 6 cases of bubonic plague with 4 deaths were reported in Wasta, Euphrates Province, Syria.

Turkey (in Asia)—Urfa Province—Akcakale.—For the week ended April 5, 1947, 1 case of plague with 1 death was reported in Akcakale, Urfa Province, Turkey.

Smallpox

Burma.—For the week ended March 29, 1947, 226 cases of smallpox with 108 deaths were reported in Burma.

Great Britain.—Information dated April 14, 1947, states that 7 cases of smallpox have been reported in Scunthrope, Lincolnshire, Great Britain. No deaths have occurred.

Niger Territory.—For the period March 11–20, 1947, 221 cases of smallpox with 20 deaths have been reported in Niger Territory.

Typhus Fever

Algeria.—Typhus fever has been reported in Algeria as follows: January 21–31, 1947, 18 cases; February 1–10, 1947, 41 cases; February 11–20, 1947, 39 cases.

X

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

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Public Health Reports

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STUDIES OF SEWAGE PURIFICATION

XVII. THE UTILIZATION OF ORGANIC SUBSTRATES BY ACTIVATED SLUDGE[1]

By O. R. PLACAK, *Senior Assistant Scientist*, and C. C. RUCHHOFT, *Principal Chemist, United States Public Health Service*

INTRODUCTION

These studies on sewage purification were started with a paper on the development of an apparatus for determining dissolved oxygen in activated sludge over 10 years ago. Sixteen papers in the series had been completed to the beginning of world hostilities in December 1941, and two related studies have also been published. From the titles of those papers,[2] it will be noted that the studies have been

[1] From the Division of Sanitary Engineering, Water and Sanitation Investigations, Cincinnati, Ohio.

[2] Preceding papers in the series are:

Theriault, E. J., and McNamee, P. D.: Studies of sewage purification. I. Apparatus for the determination of dissolved oxygen in sludge-sewage mixtures. Pub. Health Rep., 50: 480 (1935). Reprint 1680.

Butterfield, C. T.: Studies of sewage purification. II. A zooglea-forming bacterium isolated from activated sludge. Pub. Health Rep., 50: 671 (1935). Reprint 1686.

Theriault, E. J.: Studies of sewage purification. III. The clarification of sewage; a review. Sewage Works J., 7: 377 (1935). Pub. Health Rep., 50: 1581 (1935). Reprint 1715.

Smith, Russell S., and Purdy, W. C.: Studies of sewage purification. IV. The use of chlorine for the correction of sludge bulking in the activated sludge process. Sewage Works J., 8: 223 (1936). Pub. Health Rep., 51: 617 (1936). Reprint 1746.

McNamee, P. D.: Studies of sewage purification. V. Oxidation of sewage by activated sludge. Sewage Works J., 8: 562 (1936). Pub. Health Rep., 51: 1034 (1936). Reprint 1774.

Butterfield, C. T.; Ruchhoft, C. C.; and McNamee, P. D.: Studies of sewage purification. VI. Biochemical oxidation by sludges developed by pure cultures of bacteria isolated from activated sludge. Sewage Works J., 9: 173 (1937). Pub. Health Rep., 52: 387 (1937). Reprint 1812.

Ruchhoft, C. C.; McNamee, P. D.; and Butterfield, C. T.: Studies of sewage purification. VII. Biochemical oxidation by activated sludge. Sewage Works J., 10: 661 (1938). Pub. Health Rep., 53: 1690 (1938). Reprint 1987.

Butterfield, C. T., and Wattie, Elsie: Studies of sewage purification. VIII. Observations on the effect of variations in the initial numbers of bacteria and of the dispersion of sludge flocs on the course of oxidation of organic material by bacteria in pure culture. Pub. Health Rep., 53: 1912 (1938). Reprint 1999.

Ruchhoft, C. C.; Butterfield, C. T.; McNamee, P. D.; and Wattie, Elsie: Studies of sewage purification. IX. Total purification, oxidation, adsorption, and synthesis of nutrient substrates by activated sludge. Sewage Works J., 11: 195 (1939). Pub. Health Rep., 54: 468 (1939). Reprint 2050.

Ruchhoft, C. C., and Smith, R. S.: Studies of sewage purification. X. Changes in characteristics of activated sludge induced by variations in applied load. Sewage Works J., 11: 409 (1939). Pub. Health Rep., 54: 924 (1939). Reprint 2074.

Ruchhoft, C. C.; Kachmar, J. F.; and Moore, W. A.: Studies of sewage purification. XI. The removal

directed largely toward increasing our knowledge and understanding of the fundamental physical, chemical, and biological mechanisms of the secondary processes of sewage purification with the object of the application of this knowledge to the practical problems of plant design and operation.

Papers XI and XII were concerned with a study of the mechanism of the rapid removal and ultimate disposal of the nonelectrolyte solutes which occur in sewage. In the above two papers, glucose was used as an example of this type of compound and the mechanism of its removal and utilization by activated sludge was intensively studied. This study was then extended to include various other organic solutes and was well under way when interrupted by the war. Transfer of personnel and other activities prevented the continuation of the study for a number of years. Now the data which were accumulated over a period of years and embrace a wide range of compounds, including sugars, alcohols, aldehydes, organic acids, amino acids, and certain miscellaneous compounds, have finally been gathered together and summarized.

The data presented are particularly informative in the case of carbohydrates as they confirm conclusions previously drawn from glucose studies. They illustrate to some extent the great versatility of activated sludge through its ability to attack and utilize a wide variety of quite dissimilar materials. In view of the fact that activated sludge is commonly considered in relation to its utilization and stabilization of normal wastes, these data are remarkable not so much for the materials not oxidized and not usable as a source of energy, but for the very large number of chemically unlike materials utilized. Some interesting accessory phenomena such as adapability with carbohydrates and growth of *Sphaerotilus natans* are included.

of glucose from substrates by activated sludge. Sewage Works J., 12: 27 (1940). Pub. Health Rep., 55: 393 (1940). Reprint 2142.

Ruchhoft, C. C.; Kachmar, J. F.; and Placak, O. R.: Studies of sewage purification. XII. Metabolism of glucose by activated sludge. Sewage Works J., 12: 485 (1940). Pub. Health Rep., 55: 582 (1940). Reprint 2149.

Lackey, James B., and Wattie, Elsie: Studies of sewage purification. XIII. The biology of *Sphaerotilus natans* Kutzing in relation to bulking of activated sludge. Sewage Works J., 12: 669 (1940). Pub. Health Rep., 55: 975 (1940). Reprint 2166.

Ruchhoft, C. C., and Kachmar, J. F.: Studies of sewage purification. XIV. The role of *Sphaerotilus natans* in activated sludge bulking. Sewage Works J., 13: 3 (1941). Pub. Health Rep., 56: 1727 (1941). Reprint 2309.

Butterfield, C. T., and Wattie, Elsie: Studies of sewage purification. XV. Effective bacteria in purification by trickling filters. Sewage Works J., 13: 639 (1941). Pub. Health Rep., 56: 2445 (1941). Reprint 2343.

Ruchhoft, C. C., and Placak, O. R.: Studies of sewage purification. XVI. Determination of dissolved oxygen in activated sludge-sewage mixtures. Sewage Works J., 14: 638 (1942). Pub. Health Rep., 57: 1047 (1942). Reprint 2390.

Moore, W. Allan; Ruchhoft, C. C.; and Wattie, Elsie: Oxidation-reduction studies. I. Oxidation-reduction potentials developed by pure cultures in sewage. Sewage Works J., 14: 980 (1942).

Moore, W. Allan, and Ruchhoft, C. C.: Oxidation-reduction studies. II. Potentials developed in sewage and sewage activated sludge mixtures. Sewage Works J., 15: 880 (1943).

These data are not to be construed as an attempt to discover the optimum conditions for the utilization of each material used. They should, instead, be interpreted as the response of activated sludge to each material under more or less average and standardized conditions.

PROCEDURE

The oxidation studies were carried out using an aeration device previously described (*1*). Essentially it is a closed-system aeration chamber actuated by a mercury pump and containing a known volume of air The initial oxygen content may be determined as well as subsequent changes at appropriate intervals by withdrawing small samples of air for analysis. Aeration with each substance was continued for 22–24 hours, and samples taken at 1-, 3-, 5-, and 22–24-hour periods. A constant temperature of 20° C. was maintained throughout the oxidation period.

A basic mineral buffer solution (*1*) was used throughout the entire series of experiments This was presumed to contain the same mineral materials in about the same concentrations as are normally found in sewage. The following ions were contained in this solution: ammonium, sodium, potassium, calcium, magnesium, phosphate, sulphate, and chloride. The urea and peptone mentioned in the reference were omitted for these studies. An equivalent quantity of this solution was used to replace the supernatant withdrawn from one liter of activated sludge. It was thought advisable to keep the concentration of activated sludge solids at about 2,000 parts per million but at times there were variations from this ideal. In these experiments, the test material to be used as the sole source of energy or carbon was added to the prepared activated sludge mixture and the increment of oxygen utilized by this addition was determined. In all cases, an identical control sludge minus the test material was similarly run. A record of pH was kept and in most cases the sludge index was determined. The biochemical oxygen demand of the test material was determined at 2-day intervals through 10 days. In certain instances pure culture zooglea sludges with much lower solids content were used.

CARBOHYDRATES

Seven carbohydrates were studied: l-xylose, glucose, maltose, lactose, sucrose, dextrin, and soluble starch. The carbohydrate data obtained are interesting, confirming previously published data on the mechanism of glucose removal from solution by activated sludge (*2*, *3*) and extending those conclusions to a greater variety of carbohydrates, some of which are more complex in molecular structure.

Tabulated in table 1 are data concerning the nature of the carbohydrates used and the theoretical oxygen demands to be anticipated. Table 2 gives solids and biochemical oxygen demand data, and table 3 lists the experimental oxidation figures and results obtained when individual carbohydrates are used alone as a substrate feed with sludge.

It would seem that size, chemical structure, and solubility of the carbohydrate molecules are all important factors in their rate of removal from the supernatant liquor by activated sludge. Different sludges, however, would probably exert some influence; that is, the initial capacity to utilize carbohydrates might be greater in some than in others.

TABLE 1.—*Basic data on carbohydrates studied*

Carbohydrate	Class	Formula	Molecular weight	Equivalent of oxygen for oxidation	Theoretical B. O. D. per mg. per liter,[1] p. p. m.	
					Ultimate	5 day
L-xylose	Pentose	$C_5H_{10}O_5$	150.13	160	1.07	0.73
D-glucose	Hexose	$C_6H_{12}O_6$	180.15	192	1.07	.73
Maltose	Disaccharide-reducing	$C_{12}H_{22}O_{11}+H_2O$	360.31	384	1.07	.73
Lactose	Disaccharide-reducing	$C_{12}H_{22}O_{11}+H_2O$	360.31	384	1.07	.73
Sucrose*	Disaccharide-nonreducing.	$C_{12}H_{22}O_{11}$	342.29	384	1.12	.77
Dextrin	Polysaccharide	$(C_6H_{10}O_5)x$	162.14	192	1.18	.81
Starch	Polysaccharide	$(C_6H_{10}O_5)x$	162.14	192	1.18	.81

*Common sugar.
[1] On the assumption that the substrate contains enough nitrogen for the metabolic needs of the microorganisms to permit complete oxidation.

TABLE 2.—*B. O. D. removal data on activated sludge fed with carbohydrates*

[Aeration time in all experiments is 22 to 24 hours]

Carbohydrate fed	Initial concentration of carbohydrate fed in sludge liquor, p. p. m.	Sludge index	pH		Suspended solids, p. p. m.			5-day B. O. D. of supernatants, p. p. m.			Percentage of theoretical initial 5-day B. O. D. removed in 22-24 hours	Percentage of B. O. D. observed after mixing removed in 22-24 hours
			Initial	Final	Initial	Final	Indicated change	Theoretical initial	Observed immediately after mixing	Observed after 22-24 hours		
L-xylose	500	37.5	6.7	5.7	1,984	1,960	−24	365	340	140.0	61.6	58.8
Do	500	37.5	6.7	5.7	1,972	1,984	+12	365	315	155.0	57.5	50.8
D-glucose*	699	------	------	------	2,011	------	------	510	486	1.5	99.7	99.6
Do.*	979	------	------	------	1,884	------	------	715	672	3.0	99.7	99.6
Maltose	667	41.7	6.8	5.9	2,088	2,356	+268	487	320	4.1	99.1	98.7
Do	667	41.7	6.9	5.8	2,104	2,348	+244	487	310	7.1	98.5	97.7
Lactose	500	------	6.6	6.1	3,176	3,592	+416	365	249	4.2	98.8	98.4
Sucrose	500	------	6.4	6.6	3,024	3,284	+260	385	332	4.5	98.8	98.6
Dextrin	667	54	7.0	6.7	2,292	2,400	+108	540	126	51.0	90.6	60.3
Do	667	54	7.0	6.5	2,372	2,412	+40	540	117	21.0	96.1	32.1
Do	500	------	6.5	6.4	2,936	3,504	+568	405	288	5.8	98.6	98.0
Starch	500	36.3	6.5	6.7	2,492	2,380	−112	405	98	9.5	97.6	90.3
Do	500	36.3	6.5	6.5	2,528	2,412	−116	405	75	8.2	98.0	89.1
Do	500	------	6.6	5.6	3,596	3,772	+176	405	224	5.0	98.8	97.1

*From paper XII, this series, table 1, p. 583.

TABLE 3.—*Oxidation of carbohydrates by activated sludge* [1]

Carbohydrates fed	Quantity of carbohydrates fed, p. p. m.	Quantity of sludge used in experiment, p. p.m.	Mg. O_2 used in 24 hours by control sludge	Mg. of O_2 used in indicated time as a result of carbohydrate feed				Percentage of theoretical ultimate carbohydrate demand satisfied in indicated time			
				1 hour	3 hours	3 hours	22–24 hours	1 hour	3 hours	5 hours	22–24 hours
L-xylose	500	1,984	132.3	0	0	0	52.3	0	0	0	9.78
Do	500	1,972	132.3	0	1.6	2.6	37.5	0	0.30	0.49	7.50
Glucose*	1,000	....	139.9	34.3	60.2	75.0	107.8	3.21	5.63	7.01	10.1
Do	720	3,228	246.7	27.0	48.1	59.1	---- --	3.50	6.24	7.67	-------
Maltose	684	2,784	141.4	8.6	5.0	6.6	0	1.17	.68	.90	0
Do	684	3,272	176.2	27.9	56.8	71.5	163.8	3.81	7.76	9.77	22.4
Do	667	2,088	113.2	9.0	42.5	58.4	61.5	1.26	5.94	8.18	8.61
Do	667	2,104	113.2	7.3	26.7	41.5	45.2	1.02	3.74	5.81	6.33
Lactose	684	3,228	246.7	25.0	51.9	90.6	157.9	3.41	7.09	12.4	21.6
Do	684	3,028	154.4	24.6	59.4	77.5	175.1	3.36	8.11	18.6	23.9
Sucrose	684	2,784	141.4	16.6	49.3	70.0	54.1	2.17	6.44	9.14	7.11
Dextrin	667	2,292	184.5	0	13.8	10.2	0	0	1.75	1.30	0
Do	667	2,372	184.5	16.8	37.7	33.2	38.8	2.13	4.79	4.22	4.92
Starch	500	2,492	86.2	0	0	0	0	0	0	0	0
Do	500	2,528	86.2	0	0	0	0	0	0	0	0

*From paper XII, this series, table 1, p. 583.
[1] Normal activated sludge (i. e., plant sludge).

There is an adsorption of carbohydrate immediately after mixing with sludge solids. The percentage, evident in all cases, varied with the carbohydrate. It amounts to 4–7 percent for l-xylose, glucose and lactose, 13–15 percent for sucrose and maltose, and 30–80 percent for dextrin and starch. After this initial adsorption there is a continuous removal of dissolved material from solution. Referring to table 2, it is at once apparent that during a 22–24-hour aeration period, better than 90 percent of the theoretical biochemical oxygen demand (B.O.D.) of all carbohydrates used, with the exception of l-xylose, was removed from solution. Fifty to sixty percent of the l-xylose was removed. That even this low percentage may be increased under certain conditions may be seen by referring to table 4.

It has been previously demonstrated with respect to glucose that repeated feedings of that material produce a sludge capable of removing glucose at much higher rates than the unacclimated sludge. Table 4 demonstrates that this property of activated sludge can be applied to l-xylose to increase its utilization and can also be extended to starch and dextrin to increase their rate of removal. With respect to the pentose sugar, l-xylose, not only is the rate of removal more rapid over a 22–24-hour aeration period but the over-all removal is increased to about 98 percent. This is especially significant in view of the rather poor B. O. D. removal in a similar period by an unacclimated sludge. Starch exhibits a similar increased rate of removal. The over-all removal for dextrin is also much more rapid using the acclimated sludge, the 5-hour rate approaching the 22–24-hour rate in the case of the unacclimated sludge.

TABLE 4.—*Comparison of sludges acclimated to various carbohydrates with unacclimated sludges*

Carbohydrate	Acclimated sludges							Control sludges					
	Interval in hours	pH	Suspended solids, p.p.m.	Percentage ash	5-day B. O. D., p. p. m.	Percentage reduction	Percentage reduction of B. O. D. per gram solids	pH	Suspended solids, p.p.m.	Percentage ash	B. O. D., p. p. m.	Percentage reduction	Percentage reduction of B. O. D. per gram solids
Xylose	0	7.5	2,940	15.0	610	------	------	7.3	1,468	24.2	726	------	------
Do	1	-----	3,016	15.1	464	23.9	25.8	-----	1,516	22.7	673	7.27	10.3
Do	3	-----	3,316	13.5	210	65.6	69.5	-----	1,524	25.4	572	21.21	24.1
Do	5	-----	3,312	13.3	42	93.1	93.9	-----	1,524	19.4	598	17.63	20.7
Do	23	7.4	3,212	14.2	8	98.7	98.8	5.4	1,616	16.1	439	39.53	45.1
Dextrin	0	7.7	2,236	10.55	1,118	------	------	7.5	1,580	22.1	1,350	------	------
Do	1	-----	2,700	8.00	582	47.94	56.8	-----	1,696	20.0	1,276	5.48	11.9
Do	2	-----	2,856	7.98	386	65.47	73.0	-----	1,812	19.2	1,002	25.80	35.3
Do	3	-----	3,260	8.48	264	76.39	83.8	-----	1,872	17.95	878	34.97	45.1
Do	5	-----	3,192	8.47	106	90.52	93.4	-----	1,968	16.65	644	52.30	61.7
Do	23	7.3	3,132	6.90	4	99.64	99.7	7.1	2,616	13.46	26.9	98.01	98.8
Starch	0	7.5	5,532	8.97	1,506	------	------	7.4	1,616	21.0	1,540	------	------
Do	1	-----	6,140	7.88	1,048	30.41	37.3	-----	1,836	18.2	1,430	7.14	18.3
Do	3	-----	6,720	7.19	542	64.01	70.4	-----	1,920	17.3	1,266	17.80	30.8
Do	5	-----	7,124	6.90	140	90.70	92.8	-----	2,108	15.75	1,156	24.99	42.5
Do	23	7.5	6,992	7.21	16.9	98.88	99.1	7.3	2,768	12.15	204.5	86.72	92.2
Do	0	7.5	1,852	6.5	1,462	------	------	7.3	1,740	20.0	1,466	------	------
Do	22	7.3	3,244	5.8	16	98.91	99.4	7.1	2,880	14.45	213	85.60	91.2

In acclimating the activated sludges used in table 4, the solids were considerably increased and some of the data presented in the table were obtained by using acclimated sludges higher in suspended solids than the controls. That this does not alter the general trend or significance of the conclusions reached is attested by the second starch experiment run initially and at 22 hours. The acclimated sludge used here is the same one used in the first starch experiment but with the solids reduced to approximately the same as those found in a new control sludge. It will be seen that solids increase and percent B. O. D. removal are very similar to the preceding experiment.

The oxidation experiments, tabulated in table 3, emphasize that but a small portion of the material that was absorbed and utilized was completely oxidized. This is true for all carbohydrates studied. In a previous paper (*3*) it has been shown that only about 11–31 percent of the glucose that is removed from solution is completely oxidized in 22–24 hours. From the data presented in table 3, there is no evidence that any of the starch removed from solution in the first 24-hour aeration period was oxidized. In the case of dextrin about 5 percent of the material removed can be accounted for by the additional oxygen used in one experiment, but the other experiment indicates an even poorer performance. The remaining carbohydrates, l-xylose, maltose, lactose, and sucrose, were oxidized during a 22–24-hour aeration period in varying degrees ranging from 7 to 24 percent.

These values are of similar magnitude to those previously obtained for glucose. It is very apparent that all of these soluble carbohydrates which are so rapidly removed from solution by activated sludge, are not oxidized to as great an extent as the peptones and that they are utilized and retained as protoplasm in the zoogleal and other cells.

These interesting facts led to a more complete study of the removal of the complex carbohydrate dextrin from solution. The data obtained are tabulated in tables 5a and 5b. Biochemical oxygen demand removal rates, solids increases, and partition characteristics were determined using a normal activated sludge and also one which had been acclimated to dextrin by previous feedings over a period of several days. The partition characteristic was determined by incubating the several portions with diastase and titrating the reducing sugars formed with ceric sulphate (*4*).

From the data obtained it is possible to determine an approximate correlation between the biochemical oxygen demand and the amount

TABLE 5a.—*Characteristics of dextrin-acclimated and -unacclimated sludges*

[B. O. D. and solids data]

Time interval	Suspended solids, p. p. m.		Suspended-solids increase, p. p. m.		Percentage of suspended-solids increase		5-day B. O. D. of supernatant, p. p. m.		Percentage of B. O. D. utilized	
	Acclimated	Unacclimated	Acclimated	Unacclimated	Acclimated	Unacclimated	Acclimated	Unacclimated	Acclimated	Unacclimated
Before feeding	2,072	1,552					5.2	4.8		
After feeding	2,236	1,580	164	28	7.9	1.8	1,118.0	1,350.0	23.2	7.3
1-hour	2,700	1,696	628	144	30.3	9.3	582.0	1,276.0	60.0	12.5
2-hour	2,856	1,812	784	260	37.9	16.7	386.0	1,002.0	73.7	31.2
3-hour	3,260	1,872	1,188	320	57.3	20.6	264.0	878.0	82.0	39.7
5-hour	3,192	1,968	1,120	416	54.1	26.8	106.0	644.0	93.0	55.7
23-hour	3,132	2,416	1,060	864	51.2	55.7				

5-day B. O. D. of dextrin feed added=1,457 p. p. m.

TABLE 5b.—*Characteristics of dextrin-acclimated and -unacclimated sludges*

[Reducing materials data]

Time interval	Reducing carbohydrates in supernatant				Reducing carbohydrates in sludge				Percentage of dextrin not detectable as reducing material	
	Quantity, p. p. m.		Quantity, percentage		Quantity, p. p. m.		Quantity, percentage			
	Acclimated	Unacclimated	Acclimated	Unacclimated	Acclimated	Unacclimated	Acclimated	Unacclimated	Acclimated	Unacclimated
Before feeding	20	62			178	138				
After feeding	2,535	2,825	84.0	93.5	470	415	16.0	14.4	0	−7.5
1-hour	1,137	2,303	37.6	76.0	702	387	23.2	12.5	39 2	11.5
2-hour	378	1,683	12.5	55.8	473	239	15.7	7.9	71.8	36.3
3-hour	53	1,388	1.8	46.0	418	222	13.9	7.4	84.3	46.6
5-hour	14	1,020	.5	33.8	376	230	12.0	7.8	87.5	58.4
23-hour	70	103	2.3	3.4	210	232	7.2	7.7	90.5	88.9

Reducing-material value of added dextrin feed=3,020 p. p. m.

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of reducing material present and also to subdivide the reducing material into those portions present in the supernatant, in the sludge, and that increment not detectable as dextrin or its degradation products. This latter portion represents the portion removed and wholly utilized, probably retained as protoplasm in the zoogleal or other cells and contributing, together with the fraction found as reducing material in the sludge, to the increase in solids. After resolution into these three components, the portion not detectable as reducing material, with the exception of the acclimated sample during the first hour, agrees approximately with the B. O. D. removed from solution during comparable intervals.

It is erroneous to assume, as frequently is done in the case of carbohydrates, that lack of acid or gas production indicates biochemical inactivity. Rather the reverse is true, and these soluble materials are capable of being utilized in relatively large quantities and frequently at high rates.

It may be stated, then, that during a 23-hour aeration period, it is immaterial whether a sludge has been acclimated to dextrin or not as measured by over-all removal. In either case 2–3 percent of the dextrin is found in the supernatant, 7–8 percent is recoverable from the sludge, and approximately 90 percent has been completely utilized with the production of a 51–55 percent increase in sludge solids. In the intervening time intervals, however, no such agreement is indicated. In the acclimated sample these 23-hour figures are closely approached in 3 hours, 1.8 percent is found in the supernatant, 13.9 percent in the sludge and 84.3 percent utilized. At 3 hours in the unacclimated sample 46 percent is found in the supernatant, 7.4 percent in the sludge and only 46.6 percent completely utilized. It is quite evident that the rate of removal, though not the total removal, has been altered by the program of previous feedings. About twice as much reducing material is found in the acclimated sludge as in the unacclimated sludge until the twenty-third hour is reached. At the end of the first hour these amounts are 23.2 percent and 12.5 percent; from the second to the fifth hour the amount in the acclimated sludge decreases slowly from 15.7 percent to 12 percent, and in the unacclimated sludge very little change, from 7.4 percent to 7.9 percent, occurs. At 23 hours they are similar, 7.2 percent and 7.7 percent.

These differences in removal mechanism then stand out. An acclimated sludge removes approximately the same amount of dextrin from solution in 2–3 hours as an unacclimated sludge does in from 5 to 23 hours, producing at the same time proportionate increases in the

amount of sludge solids. About twice as much removed material is contained in the acclimated sludge as in the unacclimated sludge until stabilization is reached at some time interval between the fifth and twenty-third hour. After 2–3 hours any removal in the acclimated sample is at the expense of reducing material contained in the sludge. In the unacclimated sample, it is being removed from the supernatant. Both systems are similar at 23 hours and have produced approximately 50 percent more solids, the ash content of which has been reduced by about 40 percent. These solids figures deserve more consideration and will be discussed after the introduction of one more table.

In view of the considerable interest in *Sphaerotilus natans*, the ability of this organism to utilize various carbohydrates other than glucose as sources of food material was investigated. The nutrient materials used were glucose, l-xylose, soluble starch, and dextrin. The glucose sample permits a check on previously published data (*5*). In these tests contamination by other organisms was precluded.

Data obtained are tabulated in table 6. The growth response of *Sphaerotilus natans* to dextrin and soluble starch as sole sources of energy is comparable to its response to glucose. It seems, however, unable to utilize l-xylose at least within a 22–24-hour aeration period. It is probable, however, that in most cases the introduction of a carbohydrate will promote growth of *Sphaerotilus natans* (*6*).

TABLE 6.—*Growth response of* Sphaerotilus natans *to various carbohydrate substrates*

Carbohydrate	Carbohydrate feed (p. p. m.)	Initial solids (p. p. m.)	24-hour pH	24-hour solids (p. p. m.)	Increase in solids (p. p. m.)
Control	None	5.2	7.7	74	68.8
L-xylose	1250	5.2	7.3	72	66.8
Glucose	1250	5.2	5.7	640	634.8
Dextrin	1250	5.2	6.9	612	606.8
Soluble starch	1250	5.2	6.7	560	554.8

Solids figures have not been stressed much, but reference to any of the tables shows large increases in sludge solids when a carbohydrate feed is used. This fact is so persistently obtrusive that it cannot be ignored, and it possesses real significance. Whenever an activated sludge which is perfectly normal in all respects is suddenly subjected to an increase of carbohydrate feed, a fine state of balance is upset. The sludge immediately attempts to adjust itself to this alien feed and soon is consuming it in ever increasing quantities. In itself, this is desirable but, as a necessary corollary, adsorption and assimilation

at rapid rates produce enormous quantities of sludge with a low ash content. This sludge production may amount to 50 percent or more in a 24-hour period (table 5a). Such increases in solids would seriously affect the equilibrium of the average plant not designed to cope with such a factor. This is not bulking per se but simply an unruly sludge production. However, the conditions most favorable for zooglea are also well suited for the growth of *Sphaerotilus natans.* Also, as has been shown in table 6, all of the carbohydrates studied with the exception of the pentose sugar l-xylose were readily utilized by *Sphaerotilus*, resulting in a rapid increase of that organism. This is an additional hazard.

The effect then on a plant called upon to handle sudden increases in carbohydrates should be a tremendous and perhaps unmanageable increase in sludge solids, this sludge having a greatly decreased ash content. As a complicating factor, conditions conducive to the growth of *Sphaerotilus natans* would exist. Either is undesirable and serious, but if the two occur simultaneously the operation of an activated sludge plant will be seriously impaired.

ALCOHOLS AND ORGANIC ACIDS

Compounds studied belonging to the classes of alcohols and organic acids included methyl and ethyl alcohols, ethylene glycol, glycerine, formaldehyde, ammonium acetate, calcium gluconate, and formic, acetic, tartaric, citric, lactic, and oxalic acids.

The alcohols and organic acids are quite readily removed from solution with the exception of methyl alcohol and oxalic acid, as will be observed by referring to table 8. Two initial biochemical oxygen-demand figures are given, one theoretical and one observed immediate-

TABLE 7.—*Basic data on alcohols, aldehydes, and organic acids*

Compound	Synonym	Formula	Molecular weight	Equivalent weight of oxygen for oxidation	Theoretical B. O. D. per mg. per liter, p. p. m.	
					Ultimate	5 days
Methyl alcohol	wood alcohol (methanol).	CH_3OH	32.03	48.0	1.50	1.03
Ethyl alcohol	ethanol	CH_3CH_2OH	46.05	96.0	2.08	1.42
Ethylene glycol	glycol	$(CH_2OH)_2$	62.05	80.0	1.29	.88
Glycerine	glycerol	$C_3H_5(OH)_3$	92.06	112.0	1.22	.83
Formaldehyde	formalin (methanal)	$HCHO$	30.02	32.0	1.07	.73
Formic acid	methanoic acid	$HCOOH$	46.03	16.0	.348	.24
Acetic acid	ethanoic acid	CH_3COOH	60.05	64.0	1.07	.73
Tartaric acid, d or l.	weinsaure	$(CHOHCO_2H)_2$	150.09	80.0	.533	.36
Citric acid		$HO_2CCH_2C(OH)(CO_2H)CH_2CO_2H$.	192.12	144.0	.750	.51
Lactic acid		$CH_3CHOHCO_2H$	90.08	96.0	1.07	.73
Oxalic acid	ethandioic	$(CO_2H)_2.2H_2O$	126.07	16.0	.127	.086
Calcium gluconate		$C_{12}H_{22}O_{14}Ca$	430.35	352.0	.818	.56
Ammonium acetate		$C_2H_3O_2NH_4$	77.08	64.0	.83	.56

TABLE 8.—*B. O. D. removal data on activated sludge fed with alcohols and organic acids*

Compound Fed	Initial concentration of compound fed in sludge liquor, p. p. m.	Sludge index	pH		Suspended solids, p. p. m.			5-day B. O. D. of supernatants, p. p. m.			Percentage of theoretical initial 5-day B. O. D. removed in 22–24 hours	Percentage of B. O. D. observed after mixing removed in 22–24 hours
			Initial	Final	Initial	Final	Indicated change	Theoretical initial	Observed immediately after mixing	Observed after 22–24 hours		
Methyl alcohol	997	110.9	7.1	6.8	2,028	1,884	−144	1,027.0	1,004	968.0	5.74	3.6
Do	997	110.9	7.1	6.8	2,024	1,824	−200	1,027.0	914	1,002.0	2.43	0
Ethyl alcohol	1,000	61.0	6.9	5.9	1,736	2,024	+288	1,420.0	770	6.5	99.5	99.2
Do	1,000	61.0	6.9	6.1	1,732	2,080	+358	1,420.0	740	5.1	99.6	99.3
Glycol	484	76.4	7.0	5.9	1,256	1,260	+4	426.0	------	98.0	76.5	--------
Do	484	76.4	7.0	5.9	1,236	1,256	+20	426.0	------	112.0	73.8	--------
Glycerine	720	------	------	------	2,316	------	------	597.6	497	------	--------	--------
Do	720	------	------	------	600	------	------	597.6	497	------	--------	--------
Acetic acid	578	59.1	6.9	5.5	2,068	2,268	+200	422.0	455	2.6	99.4	99.5
Do	578	59.1	6.9	5.5	2,132	2,296	+141	422.0	456	2.8	99.3	99.4
Citric acid	550	62.2	7.3	7.4	2,228	2,264	+36	280.0	265	4.5	98.4	98.3
Do	550	62.2	7.3	7.4	2,240	2,324	+84	280.0	253	4.5	98.4	98.2
Calcium gluconate	250	64.6	7.4	6.5	1,428	1,436	+8	138.0	93	25.3	81.7	72.8
Do	250	64.6	7.4	6.5	1,448	1,424	−24	138.0	86	33.0	74.6	61.6
Oxalic acid	250	87.7	7.2	6.9	2,044	2,072	+28	21.5	44	27.5	0	37.5
Do	250	87.7	7.2	6.9	2,048	2,084	+36	21.5	40	22.0	0	45.0

ly after mixing. Oxalic acid shows no removal of the theoretical B. O. D. and 37–45-percent removal of the observed B. O. D. With methyl alcohol in the concentrations tried, little removal is evidenced—only 3.6 percent of the B. O. D. observed after mixing in one case and none in the other. This corresponds to 13.9 percent and 10.9 percent of the theoretical initial B. O. D. Calcium gluconate and ethylene glycol are intermediate, showing removal data ranging from 60 to 80 percent. All of the remaining test materials in this group indicate a removal of biochemical oxygen demand from solution corresponding to 98 percent or more in 22–24 hours. It is interesting to note also, that in the case of methyl alcohol with a very low amount of B. O. D. removal, there is an 8.5 percent decrease in solids while the next higher alcohol, ethanol, with a B. O. D. removal of more than 99 percent, shows an 18.5 percent increase in solids.

It should perhaps be stated here that while exact norms are not established by oxidation experiments, reasonably accurate behavior expectancies are indicated. Although every attempt has been made to maintain uniform experimental conditions, certain deviations from the normal cannot be avoided. It is not possible, for example, to use exactly the same amount of an identical sludge throughout so many experiments. Consequently, variations due to the demands of the test sludge and to its particular initial predilection for the test material may occur. However, a reasonable basis for predicting whether oxidation of material removed from solution occurs, to what extent and at what rate it occurs, is established, and if viewed in this light the data presented in table 9 are helpful and informative.

TABLE 9.—*Oxidation of alcohols and organic acids by activated sludge*

Compound fed	Quantity of compound fed, p.p.m.	Quantity of sludge used in experiment	Mg. of O_2 used in 24 hours by control sludge	Mg. of O_2 used in indicated time as a result of alcohol or acid feed				Percentage of theoretical ultimate demand of compound satisfied in indicated time			
				1 hour	3 hours	5 hours	22–24 hours	1 hour	3 hours	5 hours	22-24 hours
Methyl alcohol	500	3,272	176.2	−8.4	−5.6	7.0	110.0	0	0	0.93	14.6
Do	997	2,028	219.2	6.1	-------	4.8	41.0	.41	-------	.32	2.74
Do	997	2,024	219.2	6.2	-------	5.5	35.8	.41	-------	.36	2.39
Ethyl alcohol	1,000	1,736	106.3	6.3	37.7	83.5	512.9	.30	1.81	4.01	24.6
Do	1,000	1,732	106.3	1.5	29.5	71.5	501.9	.07	1.42	3.43	24.1
Glycol [1]	484	1,256	82.7	−2.7	4.1	3.3	48.2	0	.66	.53	7.72
Do	484	1,236	82.7	−6.0	5.6	4.4	47.2	0	.90	.71	7.56
Glycerine	720	2,316	76.0	23.4	87.5	138.7	247.6	2.7	9.96	15.79	28.19
Do	720	*600	41.9	16.3	66.6	166.4	317.9	1.86	7.58	18.94	36.19
Formaldehyde	720	2,600	107.5	−8.1	−8.7	+2.1	−29.3	0	0	.28	0
Formic acid [2]	720	2,052	75.0	29.0	43.7	49.5	100.0	11.6	17.4	19.8	39.9
Acetic acid	716	3,228	246.7	33.2	121.2	150.3	143.5	4.3	15.8	19.6	18.73
Do	716	*610	41.2	13.9	43.6	139.2	425.1	1.8	5.7	18.2	55.5
Do	716	*768	55.5	2.0	14.9	35.0	437.2	.26	1.9	4.6	57.1
Do	716	2,884	46.9	15.0	46.2	83.2	409.0	1.9	6.0	10.9	53.4
Do	578	2,068	126.5	23.4	86.9	133.4	190.3	3.8	14.1	21.6	30.8
Do	578	2,132	126.5	22.2	78.8	122.9	178.9	3.6	12.7	19.9	28.9
Ammonium acetate	1,000	3,420	70.6	40.2	173.3	308.9	659.0	4.8	20.8	37.0	78.9
Tartaric acid	720	2,141	133.4	28.4	46.6	96.6	249.8	7.4	12.1	25.0	65.0
Do	720	2,880	236.0	0	62.5	94.8	308.0	0	16.3	24.7	80.3
Do	720	*748	26.2	0.7	2.6	13.6	112.3	1.7	.67	3.5	29.3
Do	720	*768	37.9	5.1	12.9	19.0	221.2	1.3	3.4	5.0	57.6
Citric acid	720	2,141	133.4	12.2	10.2	29.9	164.8	2.3	1.9	5.5	30.4
Do	720	2,880	236.2	−14.3	−24.7	−28.1	−158.0	0	0	0	0
Do	550	2,228	158.7	−6.4	−3.0	+7.2	26.9	0	0	2.5	9.2
Do	550	2,240	158.7	−.9	15.4	25.3	44.0	0	5.3	8.6	15.0
Do	720	*748	26.2	3.3	1.4	0	80.2	.61	.26	0	14.9
Lactic acid	720	*768	37.9	13.4	54.4	80.1	320.9	1.7	7.1	10.4	41.7
Do	720	*748	26.2	14.2	28.2	42.5	535.3	1.8	3.7	5.5	69.5
Calcium gluconate	250	1,428	98.0	−3.3	18.0	18.9	27.9	0	8.8	9.2	13.6
Do	250	1,448	98.0	−5.3	18.5	19.3	28.1	0	9.0	9.4	13.7
Oxalic acid	250	2,044	101.6	−.1	−1.2	−12.8	−18.3	0	0	0	0
Do	250	2,048	101.6	−3.4	+2.2	−13.3	−24.4	0	0	0	0
Do	720	2,780	132.8	5.5	18.1	29.0	11.1	6.0	19.7	31.9	12.2
Do	720	*226	28.4	0.5	-------	5.0	18.1	.55	-------	5.5	19.9

*Pure-culture zoogleal sludge was used.
[1] Glycol was not oxidized by pure-culture zooglea.
[2] Formic acid was not attacked by pure-culture zoogleal sludge in the single experiment performed.

Formaldehyde was the only material in this group that showed no evidence of oxidation by activated sludge. It had, in fact, a detrimental effect, less oxygen being used by the formaldehyde-fed sludge than by the control sludge. The other materials studied in this group indicated some measure of oxidation of the material removed from solution. Some are quite regular in performance while others show variability in degree and sometimes in the time interval required for appreciable oxidation. Acids, in general, are readily oxidized with the possible exception of oxalic acid in which contradictory results are apparent. Two samples with activated sludge indicated no oxygen utilization, while one showed progressive oxidation until the fifth hour, 31.9 percent, and a decline to 12.2 percent at 22–24 hours. With a pure culture sludge a progressive oxidation to 19.9 percent at 22–24 hours took place, the rate, however, being extremely slow until the fifth hour. Formic acid was readily attacked by activated sludge but not by pure culture sludge in the single experiment performed. Lactic acid was readily oxidized by pure-culture sludge.

Citric acid exhibited one irregularity indicating no oxidation, although a similar sludge on the same day had successfully oxidized 80 percent of the tartaric acid in 22–24 hours. Citric acid also had a tendency to start slowly and to indicate little oxygen utilization until the fifth to twenty-fourth hours. Acetic and tartaric acids are readily and very appreciably oxidized both by activated sludge and by pure-culture sludges, although a tendency is evident for pure-culture sludges to produce less oxygen utilization during the first 3 to 5 hours. Ammonium acetate is apparently more readily oxidized than acetic acid itself. Whether this is due to the additional nitrogen introduced with the salt has not been determined.

Of the acids studied then, all were capable in varying degrees of being oxidized by activated sludge. There is an apparent tendency for this oxidation to proceed slowly using oxalic and citric acids for the first 3 to 5 hours. When pure-culture sludges are used, this tendency is apparent with all acids used. The amount of oxidation is at least as great as is found with carbohydrates, and in the case of lactic, tartaric, and acetic acids, greatly exceeds the rates with carbohydrates.

Glycerine is apparently the most easily oxidized alcohol. It is the only one studied that is oxidized to any appreciable extent in the first hour. Neither methyl alcohol nor ethylene glycol are oxidized to any significant extent up to the fifth hour. Ethylene glycol is not attacked at all by pure culture zoogleal sludge. At 22–24 hours ethyl

TABLE 10.—*Basic data—amino acids, proteins and miscellaneous compounds*

Compound		Formula	Molecular weight	Equivalent weight of oxygen for oxidation	Theoretical carbonaceous B. O. D. per mg. per liter, p. p. m.	
Common name	Scientific name when known, or synonym				Ultimate	5-day
Glycine	a-amino acetic acid	NH_2CH_2COOH	75.07	48	0.64	0.44
Alanine	a-amino propionic acid	$NH_2CH(CH_3)\cdot COOH$	89.09	96	1.08	.74
Glutamic acid	a-amino glutaric acid	$HOOC\cdot CHNH_2(CH_2)_2COOH$	147.13	144	.98	.67
Tyrosine	B-(p-hydroxyphenyl) a-amino propionic acid.	$HO\cdot C_6H_4\cdot C_2H_3(NH_2)COOH$	181.18	304	1.08	1.15
Cystine	BB′-di-thio-di-(a-amino propionic acid).	$(HOOC\cdot CH(NH_2)CH_2S)_2$	240.29	176	.73	.50
Peptone	Polypeptide				1.03	.70
Meat extract	Mineral salts and peptones.				.47	.32
Gelatin					.98	.67
Olive oil					.153	.10
Soap	Sodium oleate	$CH_3(CH_2)_7CH:CH(CH_2)_7COONa$	304.45	800	2.14	1.46
Mineral oil					.012	.008
Potassium cyanide.		KCN	65.10			
Urea	Carbamide	$NH_2\cdot CO\cdot NH_2$	60.06	0	0	0
Acetonitrile	Methyl cyanide	CH_3CN	41.05	64	1.56	1.07
Thioacetamide	Acetothioamide	$CH_3\cdot CS\cdot NH_2$	75.13	75	1.00	.68
Thioglycollic acid		$HS\cdot CH_2\cdot COOH$	92.11	64	.69	.47

alcohol and glycerine are being actively oxidized, 24 percent in the former case, and 29.0–37.2 percent in the latter. This compares with about 7.5 percent for ethylene glycol. Methyl alcohol indicates a 2.7–14.6-percent oxidation of the material removed from solution but reference to table 8 shows that a very limited amount was actually removed from solution.

Generalizing from the materials studied, it would seem that the alcohols are not as readily oxidized as the organic acids.

AMINO ACIDS, PROTEINS, AND MISCELLANEOUS COMPOUNDS

In table 11, data on the removal of B. O. D. from substrates containing various amino acids and miscellaneous compounds are presented. The amino acids are quite readily removed from solution. The removal in 22–24 hours is approximately 90 percent or more with all amino acids studied except tyrosine and cystine. The indicated removal of 5-day B. O. D. with tyrosine amounts to about 30 percent. Cystine shows no removal of the 5-day B. O. D. observed

TABLE 11.—*B. O. D. removal data on activated sludge fed with amino acids and miscellaneous compounds*

Compound fed	Initial concentration of compound fed in sludge liquor, p. p. m.	Sludge index	pH		Suspended solids, p. p. m.			5-day B. O. D. of supernatants, p. p. m.			Percentage of theoretical initial 5-day B. O. D. removed in 22-24 hours	Percentage of B. O. D. observed after mixing, removed in 22-24 hours
			Initial	Final	Initial	Final	Indicated change	Theoretical initial	Observed immediately after mixing	Observed after 22-24 hours		
Glycine	720	------	7.2	6.5	2,106	2,924	728	317.0	326.0	42.6	86.6	86.9
Alanine	500	83.0	6.6	6.9	1,296	1,416	120	370.0	327.0	14.0	96.2	95.7
Do	500	83.0	6.6	6.9	1,316	1,452	132	370.0	310.0	12.5	96.6	96.0
Glutamic acid	500	79.8	6.8	6.9	1,504	1,692	188	335.0	275.0	6.2	98.1	97.7
Do	500	79.8	6.8	6.9	1,504	1,736	232	335.0	300.0	6.7	98.0	97.8
Tyrosine	500	53.2	6.6	5.7	1,848	1,920	72	575.0	540.0	400.0	30.4	25.9
Do	500	53.2	6.6	5.8	2,072	2,152	80	575.0	540.0	398.0	30.7	26.3
Cystine	1,000	50.8	6.6	5.7	2,876	2,720	−150	500.0	48.0	67.0	86.6	0
Do	1,000	50.8	6.6	5.6	2,832	2,580	−252	500.0	34.0	46.0	90.8	0
Peptone	720	------	7.4	6.5	2,172	2,508	336	504.0	583.0	10.0	98.0	98.3
Do*	720	------	7.4	7.0	1,260	------	------	504.0	------	------	------	------
Gelatin	1,025	38.8	5.8	7.2	1,396	1,660	264	687.0	570.0	128.0	81.4	77.5
Do	1,025	38.8	5.8	7.2	1,422	1,652	230	687.0	560.0	123.0	82.1	78.0
Olive oil	916	49.0	6.9	6.1	3,372	3,828	456	95.0	------	------	------	------
Do	916	49.0	6.9	6.1	3,260	3,700	440	95.0	------	------	------	------
Soap**	1,000	48.4	6.9	6.7	2,832	3,108	276	1,710.0	408.0	49.0	97.1	88.0
Do	1,000	48.4	6.9	6.5	2,832	3,168	336	1,710.0	420.0	19.5	98.9	95.4
Mineral oil	1,000	39.3	7.1	5.5	3,036	3,184	268	8.2	------	------	------	------
Do	1,000	39.3	7.1	5.5	2,916	3,136	220	8.2	------	------	------	------
Acetonitrile	490	61.0	7.0	6.7	2,516	2,516	0	524.0	20.5	17.0	96.7	17.1
Do	490	61.0	7.0	6.7	2,548	2,564	16	524.0	15.5	21.0	96.0	0
Thioacetamide	1,000	76.0	6.9	6.7	1,768	1,848	80	680.0	0	0	100.0	0
Do	1,000	76.0	6.9	6.7	1,768	1,856	88	680.0	0	0	100.0	0
Thioglycolic acid	662	78.8	6.8	6.4	1,764	1,736	−28	311.0	0	0	100.0	0
Do	662	78.8	6.8	6.4	1,808	1,748	−60	311.0	0	0	100.0	0

*Pure culture sludge used.
**Castile soap assumed to be sodium oleate in calculating theoretical B. O. D.

immediately after mixing. Castile soap is also readily removed from solution, to the extent of about 90 percent in 22–24 hours. Gelatin is not quite as effectively removed, the percentage being approiximately 80 percent in the same time interval. Soap is remarkable also, in that approximately 75 percent of the theoretical initial 5-day B. O. D. is adsorbed and not detectable in the substrate immediately after mixing. B. O. D. data for acetonitrile, thioacetamide, and thioglycolic acid are illustrative of the toxic nature of these substances which inhibits their removal from solution biochemically.

With the exception of cystine, the amino acids are quite readily oxidized, comparing in magnitude of oxidation more closely to the carbohydrates than to the organic acids and alcohols. Cystine is quite different, however. Of the two trials made, one shows no increase in oxygen consumption due to the cystine added and the other, while showing a slight increase, 1.5 percent at 1 and 3 hours, showed

TABLE 12.—*Oxidation of amino acids, proteins and miscellaneous compounds by activated sludge*

Material fed	Quantity of material fed, p. p. m.	Quantity of sludge used in experiment, p. p. m.	Mg. of O_2 used in 24 hours by control sludge	Mg. of O_2 used in indicated time as a result of material fed				Percentage of theoretical ultimate satisfied in indicated time			
				1 hour	3 hours	5 hours	22–24 hours	1 hour	3 hours	5 hours	22–24 hours
Glycine	720	2,884	46.9	14.8	47.4	66.1	269.0	3.2	10.3	14.3	58.4
Do	720	2,316	76.0	11.2	34.7	48.3	194.3	2.4	7.5	10.5	42.2
Do*	720	768	55.5	0	13.5	29.3	237.1	0	2.9	6.4	51.5
Do*	720	600	32.9	12.3	49.5	90.0	270.7	2.7	10.7	19.5	58.7
Alanine	500	1,296	63.6	0	13.2	25.8	183.4	0	2.45	4.78	33.95
Do	500	1,316	63.6	4.1	32.1	42.1	209.0	.76	5.95	7.80	38.70
Glutamic acid	500	1,504	98.9	5.1	21.7	46.6	103.1	1.04	4.43	9.52	21.50
Do	500	1,504	98.9	16.6	24.0	33.8	152.7	3.39	4.90	6.90	31.15
Tyrosine	500	1,848	59.7	0	3.2	13.6	114.4	0	.38	1.62	13.61
Do	500	2,072	59.7	0	0	0	103.0	0	0	0	12.27
Cystine	1,000	2,876	155.4	0	0	0	0	0	0	0	0
Do	1,000	2,832	155.4	11.1	11.5	5.5	0	1.52	1.58	.75	0
Peptone	720	3,308	[1] 56.1	45.9	132.7	213.2	------	6.2	17.9	28.7	------
Do*	720	1,200	15.8	48.3	150.2	227.5	376.5	6.5	20.3	30.7	**50.8
Meat extract*	720	1,200	15.8	47.2	93.9	149.8	171.2	14.30	28.58	45.59	**52.10
Do	720	3,308	150.8	59.7	131.4	259.2	495.7	18.17	39.99	78.88	**150.85
Gelatin	1,025	1,390	110.8	0	-----	0	227.7	0	------	0	**22.60
Do	1,025	1,424	110.8	0	------	3.2	342.1	0	------	.31	**33.95
Olive oil	916	3,372	199.0	0	0	16.8	94.0	0	0	11.87	**71.38
Do	916	3,200	199.0	1.0	10.0	26.9	60.2	.7	7.06	19.01	**42.55
Soap	1,000	2,832	205.4	0	23.0	47.2	50.8	0	1.08	2.22	**2.38
Do	1,000	2,832	205.4	27.1	73.1	124.8	191.6	1.27	3.42	5.82	**8.96
Mineral oil	1,000	3,036	243.2	0	0	.8	16.5	0	0	6.66	**137.5
Do	1,000	2,916	243.2	0	3.8	2.2	13.1	0	31.4	18.38	**109.2
Acetonitrile	490	2,516	117.7	0	0	0	0	0	0	0	0
Do	490	2,548	117.7	0	0	0	0	0	0	0	0
Thioacetamide	1,000	1,768	72.0	------	6.5	0	0	------	.65	0	0
Do	1,000	1,948	72.0	------	0	0	0	------	0	0	0
Thioglycolic acid	662	1,764	142.5	20.5	20.4	9.8	0	4.48	4.46	2.14	0
Do	662	1,808	142.5	17.4	20.1	9.2	0	3.82	4.39	2.01	0
Potassium cyanide	480	2,600	107.5	0	0	0	0	------	------	------	------
Urea	1,200	2,316	76.0	.2	1.9	3.5	11.3	Theoretically, hydrolysis and not oxidation occurs.			
Do*	720	768	72.6	11.7	3.4	2.2	17.1				
Do*	720	600	32.9	1.7	2.8	2.3	2.2				

*Pure culture sludge.
**Ultimate demand computed from actual B. O. D. determinations obtained.
[1] 5 hours.

a decrease to 0.75 percent at 5 hours and no oxygen consumption at 22–24 hours. Obviously, little, if any, oxidation occurs.

With tyrosine oxidation proceeds very slowly to the fifth hour, but at 22–24 hours about 12–13 percent of the tyrosine that has been removed from solution is oxidized. Gelatin exhibits a similar slow oxidation until the fifth hour and then an appreciable increase of 22–34 percent in 22–24 hours. The more heterogeneous materials, peptone and meat extract, are apparently more easily and completely oxidized.

Two oils were used as test materials: olive oil and mineral oil, S. A. E. 30. Strict interpretations are difficult because of lack of satisfactory ultimate-demand figures. Certain conclusions may be drawn, however. Oxidation does occur in a 22–24-hour period. This oxidation is of rather small magnitude up to the third hour and it appears that a lag phase is involved.

Soap, which would normally be present as a constituent of sewage, is not too readily oxidized in the low concentrations employed for test purposes. Despite the fact that reference to table 11 indicates a removal from solution of 97–99 percent of the B. O. D. due to the added soap in 22–24 hours, only 2.38 percent is oxidized in one experiment and 8.96 percent in another.

Urea is apparently simply hydrolyzed, resulting in the production of free ammonia which accumulates to raise the pH. It does not measurably increase the carbonaceous demands or the oxygen utilization on nonnitrifying sludges.

Acetonitrile, thioacetamide, and potassium cyanide show no increase in oxygen utilization. Thioglycolic acid initially shows a small increase in the oxygen used, 3–4 percent, but this soon declines to about 2 percent at 5 hours and to none at all at 22–24 hours. These latter compounds are all apparently detrimental to the activated sludge.

DISCUSSION

Wastes vary greatly in composition and intensity. Any or even a majority of the materials considered in this paper might be found as constituents of any given waste. From even the most casual inspection of the data given, it will be evident that complex relationships must be at work in the catabolism of organic matter by activated sludge. Certainly the nature of the organic material used is a limiting factor in that it controls the extent and manner of utilization. Some materials, of course, especially those containing SH, CHO, or CN groups, are definitely detrimental. This is true also of various metallic ions not considered here.

The various organic materials may be classified according to their

chemical nature and generalities made on the basis of the resulting divisions. However, great variability will be evident even within these divisions. Activated sludge responds quite differently to methyl than to ethyl alcohol, for example. Probably the greatest similarity is evidenced by the carbohydrates. L-xylose is quite dissimilar to the other carbohydrates studied, with respect to its behavior in an activated-sludge system and also with respect to its ability to stimulate the growth of *Sphaerotilus natans*. Another determining factor is, of course, the sludge itself. We are dealing with living things when we use activated sludge, and though we can formulate certain rules and be assured that they will hold true in most cases, we cannot always be certain of that strict and complete adherence that we find in a distinctly chemical reaction. Variations will appear, and although this is at times undesirable, it also has its beneficial aspects. It certainly adds to the versatility of the sludge so that it will attack and utilize a complex variety of materials. If the sludge initially is unable to do so to any great extent, in many cases, and particularly with carbohydrates, it will adjust itself to do so. This adjustment itself may be undesirable in part, as witness the large increase in solids with carbohydrates, but essentially it is desirable, increasing the rates of removal and the consequent capacity of an activated sludge for removing carbohydrates from solution in shorter time intervals. The ability to predict the occurrence of this adjustment should make it controllable. It is impossible to say from the data accumulated for this paper just what does happen, whether a selective change in organisms, an enzymatic reaction, or both occur. The rapidity of the acclimatization suggests the formation of adaptive enzymes. For practical purposes, however, mere knowledge of the phenomena should suffice.

In the case of dextrin, the carbohydrate receiving the most detailed study, this adaptive mechanism increases the percentage of B. O. D. removal in a 3-hour period from approximately 40 percent to about 80 percent, producing at the same time, however, nearly 3 times as great a solids increase. This increase will occur anyway, of course, with equivalent decreases in substrate B. O. D.; in other words, equivalent amounts of dextrin utilized, regardless of time, should produce the same amount of sludge solids. It has been repeatedly demonstrated that the presence of carbohydrates in the substrate feed leads to a transient deposition of material within the cell (*7*). However, this maximum increase in solids with an acclimated sludge occurs at intervals somewhat comparable to the detention periods used in practice, falling off slightly thereafter. It should be noted that acclimatization of activated sludge in the presence of sufficient carbohydrate material is unavoidable. With an unacclimated sludge,

this maximum increase will not occur until the twenty-fourth hour is approached.

Ease of removal of B. O. D. from solution is more likely a function of the individual compound than of the class to which it belongs, and of course, is dependent incidentally on the characteristics of the sludge used. This removal is accomplished by several procedures—adsorption, oxidation, assimilation, and synthesis—all occurring concurrently but varying in proportion to the time interval and the substrate material.

Each grouping of the compounds studied shows some compounds with a B. O. D. removal amounting to 90 percent or more in 22–24 hours. But there are deviations from this in each group. Among carbohydrates it is l-xylose. It is true that it has been shown that adaptive procedures make l-xylose metabolism comparable to that of the other carbohydrates, but initially it is different. Among organic acids, oxalic acid and calcium gluconate show less B. O. D. removal; among alcohols, methyl alcohol and ethylene glycol; among amino acids, tyrosine. Nor does the rate of B. O. D. removal indicate infallibly to what extent oxidation may occur. The rate of oxidation is subject to great variations and each material is attacked in a different way. This has been observed on numerous occasions using specific organisms and amino acids, organic acids, alcohols and carbohydrates as substrates (*8*).

Although activated sludge consists of a tremendously varied flora and fauna and is capable of directional development in various ways under the stimulus of specific substrates, the necessary factors may not be initially present in quantity. Whether it means selective development of specific strains of organisms or production of certain enzymes, a lag phase may ensue with definite substrates. This is particularly true of certain organic and amino acids and of the oils. Since this lag phase frequently amounts to five or more hours and is longer than ordinary detention periods, it is of significance. This fact undoubtedly accounts for some of the results with pure-culture zoogleal sludges which do not attack ethylene glycol at all, and which show a trend toward slow rates of oxidation during the first 3–5 hours with organic acids.

SUMMARY

Data pertaining to the removal from solution, oxidation, and conversion to protoplasm by activated sludge, of 36 pure organic substances are presented. The materials used represent a wide range of compounds; namely, sugars, alcohols, aldehydes, organic acids, amino acids, and miscellaneous compounds. The data presented are designed to show the response of activated sludge to these materials

under average conditions and not necessarily to determine the criteria of optimum utilization.

Ease of removal of B. O. D. from solution is shown to be more likely a function of the individual compound than of the class to which it belongs, and of course to be dependent incidentally on the characteristics of the sludge used. This removal is accomplished by several procedures—adsorption, oxidation, assimilation, and synthesis—all occurring concurrently but varying in proportion to the time interval and the substrate material.

Certain pertinent facts concerning the behavior of carbohydrates when introduced into an activated-sludge system are demonstrated. There is an immediate adsorption of carbohydrate, varying from 4.7 percent with l-xylose, glucose, and lactose to 30–80 percent with dextrin and starch. It is shown, also, that the 5-day B. O. D. removed from solution in 24 hours is in excess of 90 percent in the case of all the carbohydrates tested with the exception of l-xylose. The data presented indicate, additionally, that activated sludge can be acclimated to all the carbohydrates studied and that this procedure will increase the over-all removal of l-xylose from solution, in 24 hours, from 50–60 percent to about 98 percent. It is further demonstrated that only a very small portion of these materials, which are so rapidly removed from solution, are oxidized.

Using the complex carbohydrate, dextrin, a comprehensive study of the effects of acclimatization was made by determining the partition characteristics of the dextrin in the supernatant, the sludge, and the unrecoverable carbohydrate which had been completely utilized.

The ability of all carbohydrates studied, with the exception of l-xylose, to promote the growth of the filamentous organism, *Sphaerotilus natans*, is demonstrated.

The alcohols, amino acids, and organic acids studied are shown to be quite readily removed from solution with the exception of methyl alcohol, tyrosine, and oxalic acid. All of these compounds are capable of being oxidized by activated sludge although in varying degree. Oxidation takes place readily with all amino acids studied with the exception of cystine, with which no oxidation occurs. Materials such as peptones and meat extract are shown to be more completely and easily oxidized, whereas soaps and oils are oxidized to only a minor extent. Certain compounds, especially those containing the groupings SH and CN, are not oxidized and are detrimental to sludge, while compounds such as urea are simply hydrolyzed.

Eliminating from consideration those compounds in each class that are not readily attacked by activated sludge, the data indicate the following general principle. After 24 hours of aeration with acti-

vated sludge, from 90 to 99 percent of the compound will be removed from solution and disposed of as follows for the following classes:

Class	Percentage oxidized		Percentage converted to protoplasm (organized sludge)
	Range	Mean	
Carbohydrates	5 to 25	13	65 to 85
Alcohols	24 to 38	30	52 to 66
Amino acids	22 to 58	42	32 to 68
Organic acids	30 to 80	50	10 to 60

In other words, in general, organic acids produce the smallest yield of activated sludge and carbohydrates the largest, with the alcohols and amino acids intermediate in sludge production. This explains why there is such a stimulation in sludge production when large quantities of carbohydrate wastes are added to sewage being treated by the activated sludge process.

It is demonstrated also that normal activated sludge, when subjected to an increase of carbohydrate feed, will become quickly acclimated, and because of adsorption and assimilation at rapid rates will produce enormous quantities of sludge with a low ash content. This factor should constitute an important consideration in the design of plants where this condition is likely to occur due to seasonal discharges of cannery wastes, corn or sugar products, or similar materials.

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SMALLPOX IMMUNIZATION REQUIREMENT IN CHINA

The Department of State has forwarded to the United States Public Health Service a copy of an alteration to the regulations for quarantine inspection of outbound vessels, issued by the Shanghai Quarantine Service. Pertinent portions of this alteration are presented below for the guidance of persons preparing to visit the areas concerned, and of physicians consulted by such persons.

WEISHENGSHU
SHANGHAI QUARANTINE SERVICE

Quarantine Notification No. 7 of 1947

Notice is hereby given that all outbound passenger vessels, navigating the Yangtze River ports and Ningpo, Wenchow are requested to anchor at Woosung awaiting inspection and are governed in this respect by the following regulations:

* * * * *

2. All passengers should produce valid vaccination certificates against smallpox, failing that they are required to be vaccinated before being permitted to depart and the agents will be subjected to a penalty for not abiding the regulation to book tickets with vaccination certificate.

* * * * *

4. Vessels outbound for other than the above-mentioned ports or for foreign ports are to be inspected at Shanghai as usual.
5. All outbound cargo boats or oil tankers carrying no passengers are exempted for inspection, provided that all of the crew are in possession of valid vaccination certificates.

The above regulations will become effective on and after February 17, 1947.

INCIDENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES

March 23–April 19, 1947

The accompanying table summarizes the incidence of nine important communicable diseases, based on weekly telegraphic reports from State health departments. The reports from each State for each week are published in PUBLIC HEALTH REPORTS under the section "Incidence of Disease." The table gives the number of cases of these diseases for the 4 weeks ended April 19, 1947, the number reported for the corresponding period in 1946, and the median number for the years 1942–46.

DISEASES ABOVE MEDIAN INCIDENCE

Diphtheria.—For the 4 weeks ended April 19 there were 922 cases of diphtheria reported, as compared with 1,274 for the corresponding period in 1946 and a 1942–46 median of 903 cases. The small excess over the 5-year median was due in considerable part to an increase of cases in the Atlantic coast regions. In other sections the incidence

Number of reported cases of 9 communicable diseases in the United States during the 4-week period March 23–April 19, 1947, the number for the corresponding period in 1946, and the median number of cases reported for the corresponding period, 1942–46

Division	Current period	1946	5-year median	Current period	1946	5-year median	Current period	1946	5-year median
	Diphtheria			Influenza [1]			Measles [2]		
United States	922	1,274	903	120,721	7,219	8,650	28,280	152,615	104,809
New England	47	37	29	225	19	27	7,076	7,487	8,710
Middle Atlantic	165	262	132	119	17	71	4,328	49,711	20,955
East North Central	118	205	166	3,868	276	427	5,055	35,074	26,395
West North Central	85	103	70	14,564	30	108	1,444	7,441	8,226
South Atlantic	170	191	131	36,811	1,975	2,486	4,369	11,886	11,745
East South Central	88	90	83	9,740	375	606	1,465	3,182	3,182
West South Central	127	177	169	48,582	3,831	3,831	2,070	11,676	11,676
Mountain	49	84	50	4,946	495	609	1,401	8,097	5,107
Pacific	73	125	125	1,866	201	344	1,072	18,061	14,014
	Meningococcus meningitis			Poliomyelitis			Scarlet fever		
United States	383	550	794	112	111	81	9,898	15,894	17,096
New England	12	28	45	2	3	2	899	1,287	2,211
Middle Atlantic	57	140	155	20	19	12	2,709	6,009	5,679
East North Central	85	112	152	13	10	7	2,971	3,948	4,247
West North Central	37	42	72	9	4	4	824	1,194	1,576
South Atlantic	68	68	122	9	17	10	645	1,340	1,340
East South Central	38	51	68	9	5	6	419	341	509
West South Central	45	48	73	18	21	20	195	314	492
Mountain	6	9	10	1	11	5	395	397	855
Pacific	35	52	103	31	21	21	781	1,061	1,061
	Smallpox			Typhoid and paratyphoid fever			Whooping cough [2]		
United States	43	60	60	101	241	244	10,545	7,216	10,035
New England	0	0	0	24	9	9	824	901	1,124
Middle Atlantic	13	0	0	15	23	37	1,738	1,627	1,997
East North Central	8	7	9	18	30	30	2,110	1,476	1,476
West North Central	2	3	8	13	14	10	318	214	362
South Atlantic	0	0	2	26	31	59	1,363	1,016	1,533
East South Central	5	2	4	16	26	25	588	285	463
West South Central	15	4	8	25	73	52	2,313	848	946
Mountain	0	2	2	4	15	15	324	378	547
Pacific	0	42	6	20	20	17	967	471	1,662

[1] Mississippi, New York, and North Carolina excluded; New York City included.

was about the same or less than the preceding 5-year median for this period.

Influenza.—The number of reported cases of influenza dropped from approximately 125,000 during the 4 weeks ended March 22 to 120,721 during the 4 weeks ended April 19. The current incidence was 70 percent above the 1946 incidence for the corresponding 4 weeks and 40 percent above the 1942–46 median. While apparently every section of the country felt the recent epidemic, the largest excesses over the median expectancy occurred in the West North Central, South Atlantic, and West South Central sections; minor increases were reported from other sections, the smallest increase appearing in the Middle Atlantic section. The peak of the current rise was reached during the week ended March 22 with a total of 52,000 cases reported for the week; the cases dropped rapidly during the succeeding weeks to a total of 12,616 for the last week of the current period (week ended April 19). The death rate from all causes in large cities reached a small peak during the week ended March 29, with a total of 10,814 deaths which was an increase of more than 14 percent over the preceding 3-year median for the same week.

Poliomyelitis.—The number of cases of poliomyelitis dropped from 156 during the preceding 4 weeks to 112 for the 4 weeks ended April 19. The number of cases was about the same as that for the corresponding period in 1946, and 1.4 times the 1942–46 median. The Middle Atlantic, East North Central, West North Central, East South Central, and Pacific sections reported increases over the median, while in other sections the incidence was the same as the median or fell below it.

Whooping cough.—There were 10,545 cases of whooping cough reported during the current 4-week period. The number was about 1.5 times that reported for the corresponding period in 1946, but it was only slightly above the 1942–46 median. The increase was largely due to the number of cases in the East North Central and West South Central sections. A slight increase occurred in the East South Central section, and in other sections the incidence was relatively low.

DISEASES BELOW MEDIAN INCIDENCE

Measles.—For the 4 weeks ended April 19 there was 28,280 cases of measles reported, as compared with 152,615 for the corresponding 4 weeks in 1946 and a 5-year (1942–46) median of 104,809 cases. The current incidence was considerably below the normal seasonal median in all sections of the country.

Meningococcus meningitis.—The 383 cases of meningococcus meningitis reported for the current 4 weeks was only 70 percent of the incidence during the corresponding 4-week period in 1946 and less than

50 percent of the 1942–46 median. For the country as a whole the current incidence was the lowest since 1941 when 225 cases were reported for this period. The incidence was below the seasonal expectancy in all sections of the country.

Scarlet fever.—The number of reported cases of scarlet fever (9,898) was less than 60 percent of the normal seasonal expectancy (17,096 cases). For the country as a whole the current incidence was the lowest for this period in the 19 years for which data are available in this form. Each section of the country reported a relatively low incidence.

Smallpox.—For the 4 weeks ended April 19 there were 43 cases of smallpox reported as compared with 60 for the corresponding period in 1946. The 1942–46 median was represented by the 1946 incidence Of the total cases 12 were reported from New York City and its environs (4 from Millbrook about 60 miles north of New York City). This is the first occurrence of smallpox in New York State since 1939. The present infection was introduced by a person traveling from Mexico. That patient was hospitalized and later died. One other death was reported in New York City. A fatal case was also reported from Newark, N. J., on April 17. During the current 4-week period, cases of smallpox were reported from other States as follows: Texas 13, Indiana 6, Ohio, Tennessee, and Mississippi 2 each, and Iowa, Nebraska, and Kentucky 1 each. The 13 cases in Texas were all reported from Dimmit County, and the incidence there seems to be largely responsible for an increase of almost 100 percent over the normal median incidence in the West South Central section. In 1946 an outbreak of smallpox occurred in the Seattle-King County area in the State of Washington following exposure to a case in a soldier returned from the Orient, and 64 cases were reported during the months of March, April, and May.

Typhoid and paratyphoid fever.—The incidence of these diseases was also relatively low, the number of cases (161) reported for the 4 weeks ended April 19 being about 65 percent of the 1942–46 median for the corresponding weeks. The New England, West North Central, and Pacific sections reported a few more cases than might normally be expected, but in all other sections the incidence was considerably below the median expectancy.

MORTALITY, ALL CAUSES

For the 4 weeks ended April 19 there were 40,862 deaths from all causes reported to the National Office of Vital Statistics by 93 large cities. The median number reported for the corresponding weeks in 1944–46 was 36,845. The small peak in the death rate that occurred during the week ended March 29 was no doubt due in part to the in-

fluenza epidemic that appeared in most sections of the country; the number of cases during that week was 14 percent above the preceding 3-year median, but by the last week of the current 4-week period the number of deaths dropped to less than 7 percent above the median.

DEATHS DURING WEEK ENDED APR. 19, 1947

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Apr. 19, 1947	Corresponding week, 1946
Data for 93 large cities of the United States:		
Total deaths	9,701	9,082
Median for 3 prior years	9,109	
Total deaths, first 16 weeks of year	161,513	159,800
Deaths under 1 year of age	740	631
Median for 3 prior years	631	
Deaths under 1 year of age, first 16 weeks of year	12,815	9,710
Data from industrial insurance companies:		
Policies in force	67,298,768	67,197,093
Number of death claims	12,681	11,184
Death claims per 1,000 policies in force, annual rate	9.8	8.7
Death claims per 1,000 policies, first 16 weeks of year, annual rate	9.9	11.0

INCIDENCE OF HOSPITALIZATION, JANUARY 1947

Through the cooperation of the Hospital Service Plan Commission of the American Hospital Association, data on hospital admissions among members of Blue Cross Hospital Service Plans are presented monthly. These plans provide prepaid hospital service. The data cover hospital service plans scattered throughout the country mostly in large cities.

Item	January	
	1947	1946
1. Number of plans supplying data	79	81
2. Number of persons eligible for hospital care	23,673,855	17,259,949
3. Number of persons admitted for hospital care	232,405	158,991
4. Incidence per 1,000 persons, annual rate during current month (daily rate × 365)	116	108
5. Average annual incidence per 1,000 for the 12 months ending Jan. 31, 1947	112	107
6. Number of plans reporting on hospital days	64	30
7. Days of hospital care per case discharged during month [1]	8.18	8.00

[1] Days include entire stay of patient in hospital whether at full pay or at a discount.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditons cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED APR. 26, 1947

Summary

While the incidence of influenza declined during the week, the current week's total of 8,037 cases, as compared with last week's 12,616 and a 5-year (1942–46) median of 1,734, is more than has been recorded for any corresponding week of the past 12 years, the largest number during these years (4,398) being reported for the corresponding week in 1936. Of the 8 States reporting currently more than 178 cases, with an aggregate of 7,133, or nearly 89 percent of the total, only one (Iowa, 159 to 696) showed any material increase, and this increase may represent delayed reports, as the incidence has been declining in that State since the week of March 29 (6,036 cases). Of the total this year to date, 286,790 cases, exceeding by more than 100,000 the total for any corresponding period of the past 5 years except 1944 (328,181), 246,199, or about 86 percent, occurred in the 8 weeks since March 1, following a period of comparatively low incidence throughout the fall and winter months.

Of 14 cases of smallpox reported for the week (last week 10), 4 occurred in New Mexico, 3 in Missouri, 2 in North Dakota, and 1 each in Kansas, South Carolina, Kentucky, Oklahoma, and Idaho. The last reported case in New York occurred on April 9. The total for the entire country for the year to date is 102, as compared with 167 for the same period last year, and a 5-year median of 198.

Of the total of 28 cases of poliomyelitis reported for the week, California reported 11 (last week 5), and Florida 5 (last week 2). The total since the approximate average date of seasonal low incidence (March 15) is 169, as compared with 184 for the same period last year and a 5-year median of 127.

The current and cumulative figures for diphtheria, measles, meningococcus meningitis, scarlet fever, and typhoid and paratyphoid fever are well below, while those for whooping cough are slightly above, the respective corresponding 5-year medians.

Deaths recorded for the week in 93 large cities of the United States totaled 9,434, as compared with 9,701 last week, 9,448 and 9,105, respectively, for the corresponding weeks of 1946 and 1945, and a 3-year (1944–46) median of 9,322. The total for the year to date is 170,947, as compared with 169,248 for the corresponding period last year.

Telegraphic morbidity reports from State health officers for the week ended Apr. 26, 1947, and comparison with corresponding week of 1946 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46
	Apr. 26, 1947	Apr. 27, 1946		Apr. 26, 1947	Apr. 27, 1946		Apr. 26, 1947	Apr. 27, 1946		Apr. 26, 1947	Apr. 27, 1946	
NEW ENGLAND												
Maine	0	0	0	1	--------	1	229	170	148	2	0	3
New Hampshire	0	0	0	21	--------	--------	7	31	35	1	2	1
Vermont	0	0	0	4	--------	--------	280	9	109	0	0	0
Massachusetts	13	4	4	--------	--------	--------	332	2,449	1,559	5	3	6
Rhode Island	1	1	1	1	--------	--------	294	10	10	0	2	1
Connecticut	0	0	0	12	1	--------	932	428	447	0	2	2
MIDDLE ATLANTIC												
New York	15	25	20	[1] 5	(1)	[1] 3	029	5,285	1,836	11	17	19
New Jersey	0	7	5	10	8	5	404	4,531	1,505	8	3	6
Pennsylvania	23	16	9	(2)	[2] 2	[2] 2	250	3,829	1,297	1	11	13
EAST NORTH CENTRAL												
Ohio	6	13	4	14	6	7	657	730	568	7	4	9
Indiana	9	16	5	6	3	3	119	632	198	2	5	5
Illinois	4	8	8	39	1	4	148	1,213	918	8	5	11
Michigan [3]	9	8	7	4	--------	1	128	1,696	1,078	9	6	7
Wisconsin	0	0	1	99	43	52	343	3,458	1,703	2	1	3
WEST NORTH CENTRAL												
Minnesota	6	16	3	--------	--------	--------	258	53	322	2	3	1
Iowa	1	6	2	696	--------	--------	225	268	268	2	0	1
Missouri	2	3	1	6	1	3	22	212	276	2	4	7
North Dakota	1	3	1	4	--------	1	16	5	42	0	0	0
South Dakota	0	3	1	--------	--------	--------	57	29	29	0	0	0
Nebraska	1	1	1	5	3	3	6	671	270	0	0	1
Kansas	8	4	3	2	2	2	9	402	532	2	3	4
SOUTH ATLANTIC												
Delaware	0	0	0	2	--------	--------	2	48	15	0	0	1
Maryland [3]	12	22	14	16	2	3	35	664	489	1	3	6
District of Columbia	0	1	0	--------	--------	--------	32	427	132	3	2	4
Virginia	1	14	5	2,885	142	142	464	711	381	1	7	7
West Virginia	1	8	2	33	3	9	40	132	182	3	2	2
North Carolina	8	9	5	--------	--------	1	116	485	485	2	2	4
South Carolina	5	2	4	914	239	267	216	455	150	0	0	2
Georgia	4	2	3	94	5	8	111	262	211	0	0	1
Florida	1	5	5	13	--------	1	124	311	289	0	2	2
EAST SOUTH CENTRAL												
Kentucky	7	5	4	13	--------	1	53	135	142	1	5	5
Tennessee	8	4	3	178	15	29	120	227	227	4	1	6
Alabama	2	3	7	445	11	45	305	143	143	4	8	8
Mississippi [3]	3	6	5	40	--------	--------	15	--------	--------	0	0	3
WEST SOUTH CENTRAL												
Arkansas	1	3	3	194	44	44	53	149	149	1	2	2
Louisiana	6	6	5	8	47	4	79	287	102	2	0	1
Oklahoma	2	3	3	347	17	32	4	227	227	0	0	1
Texas	16	31	20	1,459	508	654	393	2,240	1,720	4	7	15
MOUNTAIN												
Montana	2	0	1	78	--------	12	96	48	115	1	0	0
Idaho	3	4	0	22	5	1	5	178	52	0	1	1
Wyoming	0	0	0	--------	--------	--------	21	43	67	0	0	0
Colorado	5	6	8	28	10	22	69	1,289	308	0	0	2
New Mexico	1	3	2	3	7	6	62	51	51	0	0	0
Arizona	3	8	0	193	38	85	122	234	178	0	0	0
Utah [3]	0	2	0	54	2	5	11	389	270	0	0	0
Nevada	0	0	0	--------	--------	--------	--------	--------	2	0	0	0
PACIFIC												
Washington	2	8	2	15	--------	--------	46	771	318	1	3	3
Oregon	1	2	2	40	6	17	25	398	190	0	0	1
California	13	25	22	25	28	28	219	3,657	3,657	5	10	16
Total	201	316	211	8,037	1,199	1,734	8,183	40,072	26,526	92	126	202
17 weeks	4,633	6,180	4,878	286,790	181,831	71,036	98,993	379,228	314,834	1,517	3,075	4,009
Seasonal low week [4]	(27th) July 5–11			(30th) July 26–Aug. 1			(35th) Aug. 30–Sept. 5			(37th) Sept. 13–19		
Total since low	12,199	17,824	13,023	319,765	544,079	100,898	121,880	405,352	352,847	2,489	4,579	6,461

[1] New York City only. [2] Philadelphia only. [3] Period ended earlier than Saturday.
[4] Dates between which the approximate low week ends. The specific date will vary from year to year.

Telegraphic morbidity reports from State health officers for the week ended Apr. 26, 1947, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46
	Apr. 26, 1947	Apr. 27, 1946		Apr. 26, 1947	Apr. 27, 1946		Apr. 26, 1947	Apr. 27, 1946		Apr. 26, 1947 [5]	Apr. 27, 1946	
NEW ENGLAND												
Maine	0	0	0	10	36	36	0	0	0	0	1	0
New Hampshire	0	0	0	8	16	16	0	0	0	0	0	0
Vermont	0	0	0	3	6	6	0	0	0	0	0	0
Massachusetts	0	2	0	106	183	326	0	0	0	4	1	2
Rhode Island	0	0	0	8	12	19	0	0	0	0	0	0
Connecticut	0	0	0	56	73	83	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York	2	6	3	317	705	580	0	0	0	2	1	4
New Jersey	0	0	0	111	170	170	0	0	0	0	3	0
Pennsylvania	0	1	0	188	364	502	0	0	0	4	5	3
EAST NORTH CENTRAL												
Ohio	1	0	0	235	425	397	0	0	0	3	3	3
Indiana	0	0	0	104	100	100	0	1	1	5	3	2
Illinois	0	2	1	98	212	239	0	0	0	2	0	0
Michigan [3]	1	0	0	111	157	157	0	0	0	1	0	1
Wisconsin	0	0	0	77	121	178	0	0	0	1	0	0
WEST NORTH CENTRAL												
Minnesota	0	0	0	33	55	72	0	0	0	0	1	1
Iowa	0	1	0	34	45	45	0	2	1	1	0	0
Missouri	1	0	0	23	44	82	3	0	0	1	0	1
North Dakota	0	0	0	5	11	11	2	0	0	0	2	0
South Dakota	0	0	0	6	5	16	0	0	0	0	0	0
Nebraska	0	0	0	9	23	32	0	1	0	0	0	0
Kansas	0	0	0	38	38	75	1	0	0	0	1	1
SOUTH ATLANTIC												
Delaware	0	0	0	7	7	7	0	0	0	0	0	0
Maryland [3]	0	0	0	36	51	146	0	0	0	0	2	2
District of Columbia	0	0	0	9	26	23	0	0	0	0	1	0
Virginia	0	0	0	7	135	64	0	0	0	1	0	2
West Virginia	0	0	0	15	28	28	0	0	0	0	0	1
North Carolina	0	1	0	26	45	37	0	0	0	1	1	2
South Carolina	3	0	0	5	8	8	1	0	0	1	2	1
Georgia	0	0	0	8	4	15	0	0	0	3	3	5
Florida	5	14	0	9	5	9	0	0	0	2	3	3
EAST SOUTH CENTRAL												
Kentucky	0	0	0	29	31	54	1	0	0	2	0	1
Tennessee	0	0	1	32	22	44	0	0	0	0	2	3
Alabama	1	0	0	7	48	19	0	0	0	1	0	0
Mississippi [3]	0	0	0	8	5	5	0	0	0	0	1	1
WEST SOUTH CENTRAL												
Arkansas	0	0	0	4	15	11	0	0	0	2	2	1
Louisiana	2	1	0	6	10	10	0	1	1	3	3	3
Oklahoma	0	1	0	9	5	12	1	0	0	2	1	1
Texas	1	4	4	35	41	62	0	0	0	5	13	8
MOUNTAIN												
Montana	0	1	0	5	10	18	0	0	0	0	2	0
Idaho	0	0	0	1	5	37	1	0	0	0	0	0
Wyoming	0	0	0	1	21	13	0	0	0	0	1	0
Colorado	0	3	0	35	39	44	0	0	0	1	1	1
New Mexico	0	0	0	7	10	10	4	1	0	0	0	0
Arizona	0	1	0	10	11	11	0	0	0	1	0	0
Utah [3]	0	0	0	20	31	23	0	0	0	0	0	0
Nevada	0	0	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	0	1	1	32	12	44	0	2	0	1	1	0
Oregon	0	0	0	23	28	28	0	0	0	2	0	0
California	11	8	4	114	170	170	0	0	0	5	5	3
Total	28	47	27	2,080	3,624	4,104	14	8	9	57	65	87
17 weeks	795	650	429	44,960	59,920	67,902	102	167	198	738	845	995
Seasonal low week [4]	(11th) Mar. 15–21			(32nd) Aug. 9–15			(35th) Aug. 30–Sept. 5			(11th) Mar. 15–21		
Total since low	169	184	127	71,646	98,491	106,223	156	243	315	253	370	394

[3] Period ended earlier than Saturday.
[4] Dates between which the approximate low week ends. The specific date will vary from year to year.
[5] Including paratyphoid fever reported separately, as follows: Massachusetts 3 (salmonella infection); Virginia 1; Georgia 3; Alabama 1; Arkansas 1; Texas 1; Washington 1; Oregon 1; California 2.

Telegraphic morbidity reports from State health officers for the week ended Apr. 26, 1947, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Whooping cough: Week ended— Apr. 26, 1947	Whooping cough: Week ended— Apr. 27, 1946	Whooping cough: Median, 1942–46	Week ended Apr. 26, 1947: Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis, infectious	Rocky Mt. spotted fever	Tularemia	Typhus fever, endemic	Undulant fever
NEW ENGLAND											
Maine	23	25	25				1				1
New Hampshire											
Vermont	4	25	25								6
Massachusetts	111	122	129		2						
Rhode Island	14	7	18								
Connecticut	26	46	50		1						7
MIDDLE ATLANTIC											
New York	156	149	190	6	11		1			1	3
New Jersey	174	165	165	1		1					
Pennsylvania	201	126	205								1
EAST NORTH CENTRAL											
Ohio	176	69	171		1						2
Indiana	71	40	40			1					
Illinois	69	111	111	2					3		6
Michigan [3]	162	90	90	1							5
Wisconsin	193	104	104								4
WEST NORTH CENTRAL											
Minnesota	14	18	23								4
Iowa	17	29	20								9
Missouri	21	16	16			2	1				1
North Dakota			2								
South Dakota			2								
Nebraska	20		12	1							
Kansas	31	18	40		1				2		10
SOUTH ATLANTIC											
Delaware	4	1	1								
Maryland [3]	72	14	45			1					
District of Columbia	11	7	7								
Virginia	124	32	52			109					
West Virginia	32	20	17								1
North Carolina	77	55	159							1	
South Carolina	96	38	73	2	7						1
Georgia	11	9	14						1	5	3
Florida	63	5	16				1			6	1
EAST SOUTH CENTRAL											
Kentucky	11	8	28				1				
Tennessee	23	27	27			1			2		1
Alabama	120	13	10	1			1		1	3	4
Mississippi [3]	14			2	3					1	1
WEST SOUTH CENTRAL											
Arkansas	59	7	15	1	2				1		1
Louisiana	13	7	7	1					3	1	
Oklahoma	6	4	8			4		1			
Texas	644	229	316	3	218	57				9	10
MOUNTAIN											
Montana	7	3	5								
Idaho	9	12	2					1			7
Wyoming		1	1								
Colorado	14	53	25								1
New Mexico	19	5	17								
Arizona	56	14	19			29	2				1
Utah [3]	13	31	33		1				1		
Nevada											
PACIFIC											
Washington	29	47	45	3	1	7					
Oregon	13	12	19								
California	299	90	320	5	2		1				6
Total	3,322	1,913	2,832	29	250	212	9	2	14	27	97
Same week, 1946	1,913			35	420	132	11	7	11	45	102
Median, 1942–46	2,832			35	323	101	11	8	10	45	[5] 99
17 weeks: 1947	44,391			782	5,073	3,502	114	18	555	664	1,751
1946	30,902			643	4,939	1,730	142	21	315	782	1,351
Median, 1942–46	42,080			482	3,668	1,130	142	21	285	782	[6] 1,409

[3] Period ended earlier than Saturday.
[6] 2-year average, 1945–46.

Anthrax: Pennsylvania, 1 case.
Leprosy: Ohio, 1 case.
Relapsing fever: Oregon, 1 case.

WEEKLY REPORTS FROM CITIES [1]

City reports for week ended April 19, 1947

This table lists the reports from 90 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	1	------	0	41	0	1	0	0	0	1	8
New Hampshire:												
Concord	0	0	------	0	------	0	0	0	0	0	0	------
Vermont:												
Barre	0	0	------	1	8	0	0	0	0	0	0	1
Massachusetts:												
Boston	9	0	------	0	56	0	13	0	18	0	2	12
Fall River	0	0	------	0	2	0	1	0	2	0	0	1
Springfield	0	0	------	0	11	0	0	0	7	0	0	10
Worcester	0	0	------	0	9	0	5	0	4	0	0	13
Rhode Island:												
Providence	0	0	3	0	187	0	3	0	0	0	0	3
Connecticut:												
Bridgeport	0	0	1	0	17	0	2	0	1	0	0	1
Hartford	0	0	------	0	52	0	2	0	2	0	0	------
New Haven	0	0	------	0	59	0	0	0	10	0	0	2
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0	------	1	1	3	7	0	3	0	0	2
New York	17	0	4	2	278	2	63	2	95	0	1	57
Rochester	0	0	------	0	3	1	11	0	7	0	0	------
Syracuse	0	0	------	1	------	0	7	0	2	0	0	6
New Jersey:												
Camden	2	0	------	0	------	1	1	0	1	1	0	------
Newark	0	0	3	0	24	1	4	0	15	0	0	21
Trenton	0	0	3	0	22	0	5	0	5	0	0	1
Pennsylvania:												
Philadelphia	1	0	4	3	13	0	31	0	40	0	0	44
Pittsburgh	1	0	2	4	26	0	13	0	12	0	0	13
Reading	0	0	------	0	4	0	6	0	3	0	0	------
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	0	0	1	0	4	1	8	0	6	0	0	2
Cleveland	0	0	5	1	166	1	13	0	20	0	0	49
Columbus	0	0	------	0	46	0	6	0	6	0	0	23
Indiana:												
Fort Wayne	0	0	------	0	6	0	2	0	1	0	0	2
Indianapolis	0	0	------	0	6	0	6	0	21	0	0	34
South Bend	0	0	------	0	21	0	0	0	0	0	0	1
Terre Haute	0	0	------	0	------	0	2	0	1	0	0	2
Illinois:												
Chicago	0	0	5	4	12	2	30	0	35	0	0	29
Springfield	0	0	------	0	17	0	0	0	3	0	0	1
Michigan:												
Detroit	2	1	1	0	5	2	19	0	32	0	0	82
Flint	0	0	------	0	------	0	5	0	5	0	0	------
Grand Rapids	0	0	------	0	1	0	2	0	4	0	0	5
Wisconsin:												
Kenosha	0	0	------	0	------	1	0	0	1	0	0	6
Milwaukee	0	0	------	0	46	0	7	0	14	0	0	40
Racine	0	0	------	0	3	0	1	0	12	0	0	16
Superior	0	0	------	0	------	0	1	0	0	0	0	------
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0	------	0	------	0	1	0	3	0	0	3
Minneapolis	3	0	------	3	7	2	6	0	15	0	0	3
St. Paul	0	0	------	0	164	0	9	0	7	0	0	8
Missouri:												
Kansas City	0	0	1	0	1	0	3	0	3	0	0	6
St. Joseph	0	0	------	0	------	0	0	0	1	0	0	------
St. Louis	2	0	1	1	15	2	9	0	11	0	1	7

[1] In some instances the figures include nonresident cases.

City reports for week ended April 19, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
WEST NORTH CENTRAL—continued												
Nebraska												
Omaha	0	0	------	1	------	0	4	0	5	0	0	------
Kansas:												
Topeka	0	0	------	0	1	0	1	0	3	0	0	4
Wichita	0	0	------	0	1	0	4	0	0	0	0	3
SOUTH ATLANTIC												
Delaware:												
Wilmington	1	0	1	0	------	1	2	0	2	0	0	------
Maryland:												
Baltimore	1	0	4	1	7	2	8	0	17	0	1	60
Cumberland	0	0	------	0	------	0	0	0	1	0	0	------
Frederick	0	0	------	0	------	0	0	0	0	0	0	------
District of Columbia:												
Washington	0	0	------	1	24	2	9	0	7	0	0	7
Virginia:												
Lynchburg	0	0	------	0	3	0	2	0	0	0	0	2
Richmond	0	0	1	1	101	0	1	0	1	0	0	1
Roanoke	0	0	------	0	19	0	0	0	5	0	0	------
West Virginia:												
Charleston	0	0	------	0	1	0	0	0	2	0	0	2
Wheeling	0	0	------	0	------	0	3	0	0	0	0	------
North Carolina:												
Raleigh	0	0	------	0	------	0	2	0	0	0	0	1
Wilmington	0	0	------	0	13	0	1	0	0	0	0	------
Winston-Salem	0	0	------	0	28	0	1	0	2	0	0	------
South Carolina:												
Charleston	0	0	47	1	37	0	1	0	0	0	0	------
Georgia:												
Atlanta	0	0	1	1	10	0	4	0	3	0	0	------
Brunswick	0	0	------	0	------	0	0	0	0	0	0	------
Savannah	0	0	5	1	5	0	0	0	0	0	0	------
Florida:												
Tampa	1	0	4	1	5	0	2	0	1	0	0	5
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	0	0	1	3	------	1	12	0	1	0	0	5
Nashville	0	0	------	1	1	0	0	0	5	0	1	3
Alabama:												
Birmingham	0	0	20	0	35	0	6	0	2	0	0	1
Mobile	0	0	33	1	43	1	1	0	1	0	0	31
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	2	0	------	0	1	0	0	0	0	------
Louisiana:												
New Orleans	0	0	6	0	48	2	4	2	4	0	0	1
Shreveport	0	0	------	0	------	0	5	0	0	0	0	------
Oklahoma:												
Oklahoma City	0	0	14	0	------	0	2	0	0	0	0	4
Texas:												
Dallas	1	0	------	0	114	0	4	0	6	0	0	12
Galveston	0	0	------	0	------	0	0	0	0	0	0	------
Houston	1	0	2	1	4	1	1	2	1	0	0	------
San Antonio	1	0	------	0	4	0	6	0	2	0	0	4
MOUNTAIN												
Montana:												
Billings	0	0	------	0	3	0	0	0	1	0	0	------
Great Falls	0	0	------	0	69	0	1	0	1	0	0	------
Helena	0	0	------	0	1	0	0	0	1	0	0	4
Missoula	0	0	------	0	19	0	0	0	2	0	0	4
Idaho:												
Boise	0	0	------	0	------	0	1	0	0	0	0	2
Colorado:												
Denver	0	0	------	0	38	0	4	0	14	0	0	22
Pueblo	0	0	------	0	------	0	2	0	0	0	0	------
Utah:												
Salt Lake City	0	0	------	0	1	0	1	0	5	0	0	------

City reports for week ended April 19, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
PACIFIC												
Washington:												
Seattle	0	0	-----	0	3	1	3	0	2	0	0	5
Spokane	0	0	-----	0	-----	0	1	0	0	0	0	-----
Tacoma	0	0	-----	0	1	0	0	0	2	0	0	5
California:												
Los Angeles	5	0	5	0	13	1	3	2	25	0	1	36
Sacramento	0	0	-----	0	-----	0	0	0	0	0	0	4
San Francisco	2	0	-----	0	16	0	2	0	8	0	0	-----
Total	56	2	180	35	2,001	31	410	8	569	1	8	742
Corresponding week, 1946*	89	-----	28	15	13,111	-----	302	-----	1,323	4	22	426
Average, 1942-46*	66	-----	71	[2] 21	[3] 6,762	-----	[2] 362	-----	1,613	1	13	758

[2] 3-year average, 1944-46. [3] 5-year median, 1942-46.
*Exclusive of Oklahoma City.
Dysentery, amebic.—Cases: Buffalo 1; New York 9; New Orleans 2.
Dysentery, bacillary.—Cases: Worcester 1; Los Angeles 3.
Dysentery, unspecified.—Cases: Cincinnati 4; Memphis 1.
Tularemia.—Cases: St. Louis 1.
Typhus fever, endemic.—Cases: New York 3; Tampa 1; New Orleans 1.

Rates (annual basis) per 100,000 population, by geographic groups, for the 90 cities in the preceding table (latest available estimated population, 34,602,700)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza Case rates	Influenza Death rates	Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
New England	23.5	2.6	10.5	2.6	1,155	0.0	70.6	0.0	115	0.0	7.8	133
Middle Atlantic	9.7	0.0	7.4	5.1	172	3.7	68.5	0.9	85	0.5	0.5	67
East North Central	1.2	0.6	7.3	3.0	202	4.3	62.0	0.0	103	0.0	0.0	178
West North Central	10.1	0.0	4.0	10.1	380	8.0	74.4	0.0	97	0.0	2.0	68
South Atlantic	4.9	0.0	103.0	11.4	414	8.2	58.8	0.0	67	0.0	1.6	127
East South Central	0.0	0.0	318.7	29.5	466	11.8	112.1	0.0	53	0.0	5.9	236
West South Central	7.6	0.0	61.0	2.5	432	7.6	58.4	10.2	33	0.0	0.0	53
Mountain	47.7	0.0	0.0	0.0	1,040	0.0	71.5	0.0	191	0.0	0.0	254
Pacific	11.1	0.0	7.9	0.0	52	3.2	14.2	3.2	59	0.0	1.6	79
Total	8.5	0.3	27.2	5.3	302	4.7	62.0	1.2	86	0.2	1.2	113

PLAGUE INFECTION IN ARIZONA AND WASHINGTON

Under dates of April 21 and 22, 1947, plague infection was reported proved in ectoparasites from rodents in Arizona and Washington, as follows:

ARIZONA

Navajo County.—In a pool of 96 fleas and 1 tick from 2 ground squirrels, *Citellus variegatus*, collected April 2 at a location 10 miles northeast of Show Low on U. S. Highway 60, and proved positive on April 21.

WASHINGTON

Yakima County.—In a pool of 6 fleas from 1 ground squirrel, *Citellus townsendii*, and a pool of 30 fleas from field mice, *Microtus* sp., all specimens collected on April 11 at a location 6 miles east of Firing Range Headquarters, and proved positive on April 22.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended April 5, 1947.—During the week ended April 5, 1947, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox	2	17	3	163	204	24	20	38	65	596
Diphtheria		1	3	16	4	1	1			26
Dysentery:										
Bacillary				2						2
Unspecified					1					1
German measles				9	39	2	4	2	7	63
Influenza	28	13			17	3			2,504	2,565
Measles	2	69	1	69	102	335	76	130	158	942
Meningitis, meningococcus	1		1		2					4
Mumps		7		18	434	49	108	35	48	699
Poliomyelitis				1						1
Scarlet fever		2	78	70	60	2	9	1	4	226
Tuberculosis (all forms)		8	27	26	16	26	3	25	25	155
Typhoid and paratyphoid fever				1	4					5
Undulant fever				1	2				1	4
Venereal diseases:										
Gonorrhea	5	21	11	61	52	(1)	26	31	43	250
Syphilis	4	7		86	48	(1)	3	9	29	186
Other forms						(1)			5	5
Whooping cough				9	63	23	4	6	1	106

[1] Report from Manitoba for the above period not received.

JAMAICA

Notifiable diseases—4 weeks ended April 5, 1947.—During the 4 weeks ended April 5, 1947, cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Cerebrospinal meningitis	2	4	Puerperal sepsis		1
Chickenpox	5	5	Scarlet fever	1	
Diphtheria	3		Tuberculosis, pulmonary	32	60
Dysentery, unspecified	1	4	Typhoid fever	11	73
Erysipelas	1	2	Typhus fever (murine)	1	
Leprosy		3			

JAPAN

Notifiable diseases—5 weeks ended March 29, 1947, and total reported for the year to date.—For the 5 weeks ended March 29, 1947, and for the year to date, certain notifiable diseases were reported in Japan as follows:

Disease	5 weeks ended Mar. 29, 1947		Total reported for the year to date	
Diphtheria	3,651	341	9,123	910
Dysentery, unspecified	354	70	815	181
Encephalitis, Japanese "B"	1	0	1	2
Gonorrhea	18,980		45,042	
Malaria	1,027	4	2,243	9
Meningitis, epidemic	642	175	1,077	287
Paratyphoid fever	234	16	643	42
Scarlet fever	227	7	584	15
Smallpox	67	9	183	20
Syphilis	13,410		29,935	
Typhoid fever	817	106	2,745	357
Typhus fever	105	5	500	35

MOROCCO (FRENCH)

Notifiable diseases—February 1947.—During the month of February 1947, cases of certain notifiable diseases were reported in French Morocco as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	4	Paratyphoid fever	5
Conjunctivitis and ophthalmia of the newborn	5,900	Poliomyelitis	1
Diphtheria	15	Puerperal infection	11
Dysentery:		Recurrent fever	1
Amebic	1,872	Scarlet fever	1
Bacillary	169	Smallpox	14
Leprosy	10	Tuberculosis, pulmonary	863
Measles and German measles	362	Typhoid fever	65
Ophthalmia neonatorum	9,924	Typhus fever	22

TUNISIA

Notifiable diseases—Year 1946.—During the year 1946, cases of certain notifiable diseases were reported in Tunisia as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	29	Poliomyelitis	70
Diphtheria	81	Rabies	21
Dysentery, amebic and bacillary	32	Recurrent fever	966
Leprosy	1	Scarlet fever	28
Malaria	7,855	Smallpox	797
Measles	368	Tuberculosis	578
Mediterranean fever	1	Typhoid and paratyphoid fever	833
Mumps	112	Typhus fever	512

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

India—Calcutta.—Cholera has been reported in Calcutta, India, as follows: Weeks ended—April 5, 1947, 147 cases; April 19, 1947, 441 cases, 146 deaths.

Plague

China—Amoy.—For the week ended April 5, 1947, 1 case of plague was reported in Amoy, China.

Madagascar.—During the month of February 1947, 59 cases of plague with 49 deaths were reported in Madagascar. During the month of March 1947, 24 cases of plague with 23 deaths were reported.

Turkey (in Asia)—Urfa Province—Akcakale.—For the week ended April 12, 1947, 10 cases of plague were reported in Akcakale, Urfa Province, Turkey.

Smallpox

Belgium—Liege.—On April 19, 1947, 16 cases of smallpox (alastrim) were reported in Liege, Belgium.

China—Shanghai.—For the week ended April 5, 1947, 122 cases of smallpox with 23 deaths were reported in Shanghai, China.

Colombia.—For the month of March 1947, 225 cases of smallpox with 2 deaths were reported in Colombia.

Great Britain—England—Stepney.—For the week ended March 22, 1947, 1 case of smallpox was reported in Stepney, England.

Malay States (Federated).—For the week ended April 5, 1947, 114 cases of smallpox with 33 deaths were reported in the Federated Malay States.

Morocco (International Zone)—Tangier.—For the week ended February 22, 1947, 14 cases of smallpox were reported in Tangier, Morocco (International Zone).

Sierra Leone.—For the week ended February 22, 1947, 53 cases of smallpox with 5 deaths were reported in Sierra Leone.

Tunisia.—Smallpox has been reported in Tunisia as follows: February 11–20, 1947, 38 cases; February 21–28, 1947, 67 cases; March 1–10, 1947, 62 cases.

Typhus Fever

Colombia.—For the month of March 1947, 159 cases of typhus fever with 3 deaths were reported in Colombia.

Tunisia—Typhus fever has been reported in Tunisia as follows: February 11–20, 1947, 27 cases; February 21–28, 1947, 21 cases; March 1–10, 1947, 22 cases.

Union of South Africa.—For the month of January 1947, 41 cases of typhus fever were reported in the Union of South Africa.

Yellow Fever

Colombia—Santander Department.—Yellow fever has been reported in Santander Department, Colombia, as follows: Bolivar, Landazuri, February 14, 1947, 1 death; Jesus Maria, La Belleza, March 2, 1947, 1 death; San Vincente de Chucuri, Aguadulce, February 17, 1947, 1 death; Velez, Jordan, February 24, 1947, 1 death.

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FEDERAL SECURITY AGENCY

United States Public Health Service

Thomas Parran, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

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Public Health Reports

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VOLUNTARY HEALTH INSURANCE IN WESTERN EUROPE

ITS ORIGINS AND PLACE IN NATIONAL PROGRAMS [1]

By GEORGE ST. J. PERROTT, *Chief, Division of Public Health Methods, United States Public Health Service*, and JOSEPH W. MOUNTIN, *Medical Director, United States Public Health Service.*

A previous article [2] has shown the wartime and postwar developments in the health security programs of England, France, Belgium, Sweden, Denmark, and the Netherlands. The present paper traces for the same countries the origins and historical development of the voluntary health insurance systems from which the present programs have evolved. A description of this evolutionary process in Western Europe should be particularly timely because of the widespread interest in the voluntary health insurance movement throughout the United States.

In all six countries, voluntary health insurance originated with the medieval guilds. As these guilds passed out of existence, members of the community formed other self-governing societies to provide sickness benefits as well as other types of mutual assistance. By the end of the eighteenth century in England, and during the nineteenth century in the five other countries, steps were taken through Government to encourage the development of these societies by offering them legal status and exemption from certain types of taxes if they accepted an elementary form of public supervision to assure protection of the members' interests.

The form of public supervision, and the extent to which it included actuarial and other types of fiscal control, varied widely among countries. England, for example, enacted a law in 1819, which required friendly societies (a form of mutual benefit association) to

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[1] From the Divisions of Public Health Methods and States Relations.

The authors gratefully acknowledge the services of E. B. Kovar, Martha D. Ring, and Arthur Weissman in selecting, summarizing, and collating data.

[2] See Health Insurance Programs and Plans of Western Europe; A Summary of Observations. Pub. Health Rep , 62:369-399 (Mar. 14, 1947).

submit their tables of contributions and benefits to the authorities for actuarial approval. This requirement was withdrawn in 1829, but actuarial certification was required under subsequent laws. The laws of Sweden (1891), Denmark (1892), Belgium (1894), and France (1898) required "approved" societies to show that their income was sufficient to meet their obligations. During this period the Netherlands instituted no specific financial controls for sickness benefit societies.

The successive stages of further legislative action were designed to increase coverage and the value and scope of benefits, distribute risks, and assure financial solvency.

The timing of contribution from national revenues toward voluntary health insurance also differed among countries. The first laws providing for this financial aid to mutual benefit societies were enacted in 1852 in France; in 1891 in Sweden; in 1892 in Denmark; and in 1898 in Belgium. No such aid to voluntary health insurance organizations was provided in the Netherlands or England. When compulsory health insurance was established in England under the law of 1911, however, provision was made for Government grants to that system, with approved societies participating only in the administration of cash sickness benefits.

In Denmark the conditions for receipt of public subsidies by "approved" societies included election of governing bodies by the members and fiscal controls. Furthermore, approval was accorded only to societies which (1) had more than a specified number of members; (2) admitted anyone in the area to membership if he met certain general requirements; and (3) guaranteed sickness benefits within certain maximum and minimum limits of amount and duration. Specifications of other countries included some but not all of these requirements at various stages of the development of national health insurance.

From the 1890's to the early 1940's, developments in voluntary health insurance were, as a whole, marked by (1) greatly increased membership, (2) amalgamation and federation of benefit societies to form large units which covered wide geographic areas and provided broader distribution of risks, (3) wider scope of medical benefits, (4) increased public supervision and control, (5) an increase in the volume of significant information on the incidence and duration of illness made available for actuarial purposes, and (6) in England and the Netherlands, the emergence and expansion of special voluntary insurance plans for physicians' services, hospitalization, and home nursing. During this period, however, Denmark was the only country in which health insurance provided medical and hospital benefits to nearly all persons in the population. By 1947, the other

five countries had enacted legislation establishing broad integrated programs of social security. In the field of medical care these programs provide much wider coverage, higher cash sickness benefits, and more comprehensive medical services than in former years.[3]

Denmark administers health insurance through approved mutual benefit societies, as during earlier years. Under their new laws, Sweden and Belgium retain similar societies to administer their Nationwide compulsory health insurance system. In its compulsory program, the Netherlands retains separate agencies for cash sickness and medical benefits, with the latter still administered by approved societies. France has created provincial and regional quasi-governmental agencies under the laws of 1945 to administer health insurance and other benefits within designated geographic areas; provisions for the election of the governing bodies of these agencies assure representation of insured persons.

England's approved societies will no longer participate in the national program; their functions in that program, i. e., the administration of cash sickness benefits, are to be transferred to regional and local offices of the Ministry of National Insurance. There is no provision for medical benefits under the insurance system; a National Health Service, to be established in 1948 under the Ministry of Health, will provide comprehensive medical service for the entire population. Provision for regional and local advisory or executive committees and councils representing varied interests will serve to decentralize the administration of the health service.

The following sections, which outline the origin and development of voluntary health insurance in the individual countries, also give some indication of the remaining role of such insurance in meeting national health needs.

ENGLAND AND WALES

Early History.—In England, the association of persons to provide mutual assistance during personal and family emergencies has been traced to seventh century religious and social guilds. These organizations and the craft guilds of the Middle Ages are said to be the forerunners of the present-day Friendly Societies which were formed during the seventeenth century on a fraternal, craft, or religious basis.

The industrial revolution, with its attendant shift of rural populations to urban centers, gave impetus to the friendly society movement. By the latter part of the eighteenth century these organizations were sufficiently numerous and important to merit legislative recognition, protection, and control. The Friendly Societies Act of 1793 gave encouragement to, and instituted elementary controls over, "societies for raising, by voluntary subscription of the members, separate funds

[3] See reference cited in footnote 2 for the provisions of these new programs.

for their mutual relief and maintenance in sickness, old age, and infirmity."

19th Century Developments.—In the nineteenth century, as the friendly societies increased in number and membership, additional legislative regulations were imposed, including requirements of formal registration and actuarial certification. Other developments in voluntary health insurance during this period include (*a*) establishment of actuarial bases for the administration of insurance funds, (*b*) increased public regulation of the societies, (*c*) federation of many small fraternal societies into several large organizations, and (*d*) growth and development of a variety of plans for providing sickness benefits and other assistance to members and their dependents. Financial aid and medical treatment were furnished by trade union benefit funds, church funds, medical aid societies, shop clubs, and other organizations, and also through work contract arrangements in collieries and industrial plants.

Only a fraction of the population was covered by these organizations, however, and most of the coverage was among skilled urban workers. The benefits were limited both in type and duration. In many instances when medical services were made available through contract arrangements between the societies and physicians, these arrangements proved unsatisfactory. The medical profession was dissatisfied because of the lack of medical control over the treatment furnished, inadequate remuneration for services provided, and the generally poor working conditions of the contract doctors. Although financial administration had been greatly improved by the use of morbidity and mortality data for actuarial purposes, a large proportion of the small societies were unable to meet their liabilities.

National Health Insurance Act of 1911.—Compulsory health insurance began in Great Britain on July 15, 1912. The National Insurance Act of 1911, the authority under which the new system was established, provided small cash benefits during sickness, disablement, and maternity, and medical benefits consisting largely of general practitioner's services (including medicines). Coverage was restricted to employed persons aged 16–70. Dependents of insured persons were not covered, and persons employed in nonmanual labor were excluded if their annual pay exceeded £160. This income limit was increased to £250 in 1920 and to £420 in 1942. Ordinary cash sickness benefits paid under compulsory health insurance originally were 10 shillings or less a week, depending on sex and marital status. In 1920, these weekly rates were increased to 15s. for men and 12s. for women. As of January 1942, the benefits were raised again, this time to 18s. for men, 15s. for unmarried women, and 13s. for married women. Under the act of 1911, the qualifying period for cash sickness

benefits was set at 26 weeks of contribution. Beginning with 1918, persons having at least 26 but less than 104 weekly contributions to their credit received reduced payments. Cash sickness benefits were limited in duration to 26 weeks, after which reduced amounts were payable as disablement benefits.

A limited number of persons were permitted to become voluntarily insured under the national health insurance system. This provision applied to persons who had been insured for two or more years and who were no longer in covered occupations and to several other classes of formerly insured workers.

Under the act of 1911, central administration of cash sickness and medical benefits was placed in the Ministry of Health. Special local committees were established (on a county and county borough basis) to administer medical benefits. Chief among these special units are the insurance committees—consisting of 20 to 40 members representing insured persons, local public bodies, and medical practitioners—which enter into agreements with local doctors and pharmacists. On certain matters, these committees must confer with other committees representing all physicians in the area (local medical committees), insurance practitioners (panel committees established under the Insurance Act of 1913), and insurance pharmacists (pharmaceutical committees).

The act of 1911 authorized voluntary, nonprofit societies, on approval of the Minister of Health, to administer national health insurance cash sickness benefits for compulsorily insured persons admitted to membership in these "approved societies." For approval, the constitution of the nonprofit society had to provide that the affairs of the society would be subject to the absolute control of its members.

These approved societies, particularly the industrial assurance companies (which were permitted to set up separate nonprofit sections as approved societies) and the centralized friendly societies, i. e., those without branches, attracted millions of members. From 1915 to 1936, total membership in approved societies in England and Wales eligible for national health insurance benefits increased from 11,758,600 to 15,809,910. The Beveridge Report gives the following distribution of membership by type of approved society in Great Britain and Northern Ireland for the years 1923 and 1938:

Type of society	1923	1938
Total	15,190,000	18,170,000
Industrial life offices	6,870,000	8,470,000
Friendly societies without branches	3,550,000	5,140,000
Friendly societies with branches	3,150,000	3,000,000
Trade unions	1,510,000	1,480,000
Employers' provident funds	110,000	80,000

With larger membership, improved financial status, and improved fiscal policies, many of the approved societies were able to increase the types and amounts of benefits. These societies were authorized, under certain conditions, to use their disposable surpluses for the provision of additional benefits to compulsorily insured persons who had been members for several years. Such surpluses were determined at quinquennial valuations of the societies' funds. Authorized additional benefits included cash benefits, dental and ophthalmic services, medical and surgical appliances, and treatment in convalescent homes and hospitals.

One of the developments of the nineteenth century was the federation of small friendly societies into large organizations. This process of consolidation continued among the approved societies, resulting in an appreciable reduction in their number.

Voluntary Insurance for Medical Benefits.— Although for many years medical aid societies and other organizations had been providing some hospital care for their members in convalescent homes and other institutions financed and maintained by the societies, voluntary hospitalization plans as such are almost exclusively a twentieth century development. Only one such plan had existed before the end of World War I—the Hospital Saturday Fund. Shortly after that war, a number of plans were started to give assistance to the financially distressed hospitals and to provide hospital care and services to contributing members of low income.

The number and membership of these hospital plans grew rapidly. The number of contributors to the Hospital Savings Association, a leading contributory scheme, increased from 15,356 in 1923 to 2,223,765 in 1945. In 1946, the British Hospital Contributory Schemes Association had 250 affiliated local schemes or plans; for that year, the association estimates that membership in these organizations amounted to 11 million contributors, and benefits were said to be available to an estimated 25 to 30 million persons. A survey of 167 hospitals in London (1944) revealed that, on the average, 13 percent of the total ordinary income of these institutions was derived from contributory schemes.

Special provident schemes were organized to provide prepayment methods of defraying the cost of hospitalization, care in nursing homes, and specialists' services, for persons of higher income. The King Edward's Hospital Fund for London sponsors one scheme of this type—the Hospital Service Plan—through the London Association for Hospital Services. The Nuffield Provident Fund sponsors similar plans through the Central Provident Association.

In the field of clinic services, a number of dispensaries depended in part on provident contributory schemes for their support. In

contrast to the growth and development of other prepayment plans, dispensary provident schemes are reported to have declined in importance since the introduction of national health insurance. This drop has been attributed partly to the establishment of public clinics and to the provision of out-patient services by hospital contributory plans.

Exclusively physician-controlled types of voluntary health insurance organizations such as the doctors' clubs and the "public medical services" plans, which were started in the nineteenth century, developed and grew during this period. In the main, these organizations provide general practitioner's services for dependents of compulsorily insured persons and persons of like income. During 1946 there were approximately 80 public medical service plans in operation in which some 6,000 doctors were cooperating. The number of contributors to doctors' clubs and public medical service plans is not known, but one estimate (1944) places the figure in the vicinity of a million.

District nursing associations, formerly dependent almost exclusively on voluntary donations for support, adopted provident contributory schemes to supplement their inadequate funds. In this way, home nursing care is provided to contributing members and their families, and the weekly payments by members help support the services provided for indigent persons in the community.

Before 1912, the overwhelming majority of persons covered by voluntary schemes were workers of relatively low income and dependents of these workers. After 1912, even though this class of persons clearly predominated in the coverage afforded by voluntary health insurance, new plans were developed and existing ones were extended to permit membership of persons with higher incomes. Some public medical service plans and hospital contributory schemes increased the income limits for membership in extensions of their plans or in new schemes. New organizations, such as the Central Provident Association established in 1943, removed all income limits for membership.

Since 1912, both newly created and formerly established national associations and committees have played increasingly important roles in the voluntary health insurance movement. They include the National Conference of Friendly Societies, the National Conference of Approved Societies, the Public Medical Service Subcommittee of the British Medical Association, and the British Hospital Contributory Schemes Association. Such national organizations provide a means for interchanging information on administrative, fiscal, and actuarial management and on other problems common to voluntary health insurance agencies. They have promoted the establishment

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of prepayment plans in new areas and for additional groups of the population. Moreover, some of these organizations have been instrumental in achieving a degree of equalization of the contributions and the benefits provided by similar plans.

From the developments during 1912–45, it appears that voluntary health insurance has provided medical care to a greater or lesser extent for millions of persons inadequately covered under the compulsory health insurance system instituted in 1912 and for millions excluded from that system.

Although great progress was made from 1912 to 1945 in providing cash sickness benefits and medical care for the general population through voluntary and compulsory health insurance, the voluntary schemes fell far short of adequately supplementing the existing compulsory system. Coverage was still restricted—because large numbers of persons either could not afford membership, or were bad insurance risks, or did not choose to join. Benefits were still limited—because considerations of membership appeals require relatively low contribution rates, and solvency considerations limit the amount and duration of benefits which the funds can afford. Surveys have pointed out these and other features of the voluntary health insurance system. There is wide divergence in the type, amount, and duration of benefits received for similar contributions. Disproportionately large amounts of contributions are allocated to reserves, and, in some plans, excessive amounts are allocated to collection costs. In many plans there is little if any active participation by consumers of the service in management controls over the services provided. And the very large number of prepayment plans produces competition for membership and duplication of management, administration, operation, and overhead expenses.

To correct these deficiencies, the following types of remedial measures have been suggested: providing Government contributions to cover poor insurance risks and meet costs for the indigent and near-indigent; raising the income limits for compulsory insurance and increasing the classes of insured persons, e. g., dependents and families of insured persons; requiring that approved societies pool their surpluses not only to reduce the amount of reserves needed by individual societies but also to eliminate disparate benefits for similar contributions; eliminating excessive collection costs; instituting improved administrative and fiscal procedures; and providing for active participation in management of societies and funds by consumers as well as by providers of service.

These remedial measures, however, were rejected in Great Britain in favor of an integrated program of increased cash benefits for *all* social security purposes and a comprehensive system of medical bene-

fits (including hospital care, specialist's and general practitioner's services, and public health preventive services) for all persons irrespective of their insurance status.

National Insurance Acts (1944 and 1946) and the National Health Service Act (1946). -In 1944, the National Insurance Act established a Ministry of National Insurance. Under the provisions of the act and by an Order-in-Council dated 1945, the powers and duties of the Minister of Health under then existing National Health Insurance Acts (except those powers and duties relating to the administration of medical benefits) were transferred to the Minister of National Insurance. Thus, the administration of cash benefits was given to the new Ministry.

The National Insurance Act of 1946 appreciably increased cash benefits for wage loss during sickness and cash benefits for other social security purposes; increased the adequacy of these benefits by providing supplementary payments for dependents of insured persons; and provided for regional and local offices of the Ministry of National Insurance to administer cash sickness as well as other types of social security benefits. Under this act, which is expected to go into full operation in 1948, the approved societies will no longer participate in the administration of compulsory health insurance; their reserves, together with all their other assets derived from national health insurance sources, will be turned over to the new Ministry. Other legislation in 1945 and 1946 increased the scope of cash benefits to be administered by the Ministry of National Insurance.

The National Health Service Act for England and Wales (1946) provides for comprehensive medical benefits for all persons with no restrictions based on age, sex, income, dependency status, or existing or preexisting physical or mental condition. The provisions of this act are also expected to be put into effect in 1948.

With the passage of these laws, the voluntary health insurance movement in England is confronted with the most serious problems in its long history, for many of the administrative, social, and financial functions served by voluntary organizations are assigned to public agencies.

1. Under the original compulsory health insurance system, friendly societies, industrial assurance companies through their "nonprofit sections," trade union benefit funds, and other organizations were authorized, on Government approval, to administer cash benefits for wage losses during illness. Under the new National Insurance Act, the approved societies will no longer administer the cash benefits provided by law. Governmental agencies under the Ministry of National Insurance will handle these as well as maternity, unemployment, old age, and other cash benefits of the insurance program.

The favored position of the approved societies under compulsory health insurance will soon be a thing of the past.

2. Since 1912, the chief contribution of the societies and other voluntary health insurance organizations has been that of supplementing the inadequate benefits and coverage of the compulsory insurance system. The schedule of increased cash benefits and the extensive medical services to be offered under the new legislation will cut deeply into this social function of voluntary insurance. Medical benefits under the National Health Service Act will include services of general practitioners, specialists, hospitals, and nurses, as well as pharmaceutical, dental, ophthalmic, maternal and child welfare, home nursing, vaccination, and immunization services The medical and preventive services are to be improved and extended by the establishment of adequately equipped health centers for the use of general practitioners and local health authorities.

3. The National Health Service Act, moreover, provides for governmental administration of all hospitals. The hospitals are to be financed from public funds, supplemented by payments from national insurance sources. Local health authorities are authorized, subject to approval by the Ministry of Health, to enter into agreements with nursing associations for provision of health visiting and home nursing services. With financial support assured, the necessity for voluntary schemes to provide income for hospitals and nursing associations will be obviated to an appreciable extent if not completely.

Future of Voluntary Health Insurance.—The broad coverage and greatly increased benefits to be provided under the new laws will probably result in (1) marked changes in the types of benefits offered through voluntary health insurance, (2) reduced membership in voluntary schemes among low-income groups, (3) liquidation of some of the organizations, particularly those designed to serve low-income groups, and (4) consolidation or federation of some of the remaining voluntary schemes.

Intensive planning has been going on for some time among the approved societies and other voluntary organizations to determine how best to continue after the new system begins to function in 1948. It seems likely that approved society plans will emerge which will offer one or more of the following types of programs for voluntary subscribers: cash sickness benefits to supplement those provided under the National Insurance Act of 1946; special medical appliances and services not provided under the National Health Service; lump-sum payments at specified ages, e. g., 65; and life insurance.

In view of the comprehensive medical services to be offered to all persons under the National Health Service Act, it would appear that the area of medical benefits left to voluntary health insurance will be

narrow. Many plans which were established for low-income groups previously not covered under the compulsory system, including a number of specialized plans offering general practitioner's, hospital, or home nursing services, will probably cease.

Persons in upper and middle-income groups, however, may want to continue to make their own arrangements for medical services. Wealthy persons will doubtless continue to purchase their medical care directly and not through the medium of insurance. A segment of the middle-income population may seek private medical services and pay for such services through voluntary insurance or on some other prepayment basis.

When the new system of comprehensive medical service begins to function sometime in 1948, there undoubtedly will be an excessively heavy load on the medical facilities and personnel of the National Health Service. Persons who now are not covered or are not covered adequately by compulsory or voluntary insurance will seek medical attention not only for current illness and disabilities, but also for preexisting conditions and for preventive treatment which they had neglected or postponed for financial reasons. Many persons who can afford to pay for medical services either on a prepayment basis or otherwise will make such expenditures for private care. Plans now available which are designed for persons of higher income (e. g., Central Provident Association schemes, hospital service plans, and extensions of public medical service plans) may continue in operation.

The move towards greater consolidation of voluntary plans is evidenced in a recommendation made by the Hearts of Oak Benefit Society at the 1946 annual meeting of the National Conference of Friendly Societies, and by a proposal drafted by the Nuffield Foundation, to amalgamate provident schemes and similar plans into a national provident scheme. This scheme [4] proposes to serve "that section of the community which will prefer to make its own arrangements for hospital and specialist medical services."

FRANCE

Origins.—In common with other nations of Western Europe, France has had long experience with voluntary insurance against sickness. Soon after the Revolution of 1789, mutual benefit societies, furnishing insurance against sickness, began to organize. At first, the authorities were suspicious of these societies, since they seemed to resemble the medieval trade guilds which were forbidden by law. But the societies soon proved that they were not dangerous to public order and began to gain members rapidly.

[4] Notes on the Proposal for a National Provident Scheme. Mimeographed document prepared by the Nuffield Foundation.

Although by an act passed April 10, 1834, mutual societies were permitted to operate after receiving special authorization, their situation remained precarious, since this authorization could be withdrawn at any time. They received no special powers or legal standing until July 15, 1850, when an act was passed establishing procedures by which mutual benefit societies could become "recognized societies of public utility." This "recognition" gave them certain privileges such as legal status, the right to own property, and freedom from specific types of taxation, and at the same time made them subject to the general supervision of provincial and municipal authorities. In addition, the regulations of recognized societies had to specify conditions for admission of members, rights to benefits, methods of collecting contributions, and the like. The act of 1850 remained almost inoperative, however, because few authorized mutual societies applied for recognition.

Under the decree of March 26, 1852, establishing a new class of "approved" societies, mutual benefit societies were made subject to more stringent legal requirements. Approval was granted to mutual benefit societies whose bylaws were acceptable to the provincial authorities.[5] Approved societies received legal status, exemption from stamp and registration taxes, and the use of a public meeting place free of charge. In addition, they could obtain contributions from public funds and certain other financial advantages. Approved societies were required, in return, to submit to supervision by the prefects (provincial authorities) and the Minister of the Interior; to report annually on their financial condition; and to supply statistics on sickness and other data. Approved societies could be suspended or dissolved by a prefect for violations of their own constitutions or of existing laws, and their presidents had to be chosen by the Government.[6] Furthermore, they could not have less than 1,000 members, both participating and honorary,[7] and no more than 500 participating members without the prefect's permission; and their regulations had to establish contribution rates in conformity with approved sickness and mortality tables.

Law of 1898.—The law of April 1, 1898, marking the first important changes in the status of mutual societies under the 1852 decree, set up two categories of mutual benefit societies: free and approved. Both types were required to deposit copies of their constitutions, regulations, and lists of officers with the central authorities before they

[5] In the province in which Paris is located, bylaws had to be submitted to the Minister of Interior for approval.

[6] A decree of September 1870 changed this requirement to allow societies to elect presidents according to their own rules

[7] Participating members were those receiving benefits in return for contributions, while honorary members either paid a fixed contribution or made donations to the societies without drawing benefits.

could operate. Thereafter, free societies were not subject to further administrative regulation. Approved societies, on the other hand, remained under administrative regulation but had the right to a national grant, whereas free societies could receive only provincial and communal contributions. Recognized societies, still in existence under authority of the law of 1850, had essentially the same privileges and were placed under much the same obligations as approved societies.[8]

Both free and approved societies were permitted to offer sickness, invalidity, survivors', life, and other types of insurance, and to form federations for reinsurance and other specified purposes. All societies were required to furnish annual reports to the Minister of the Interior, and all were restricted by the law with regard to the disposition of their savings and investments, but approved societies were more closely restricted than free ones. On the other hand, approved societies had the right to buy, sell, and own real estate up to three-quarters of their assets, and to receive bequests and donations without restriction, whereas free societies could own only the real property needed for administrative purposes, and had only a limited right to receive bequests and donations. Approved societies received, in addition, certain special financial advantages, and were exempt from all stamp, registration, notarization, and certification taxes. The law also specified that contributions from public funds were to be refused to approved societies which granted their members average daily indemnities of more than Fr. 5,[9] annual pensions of more than Fr. 360, or lump-sum payments of more than Fr. 3,000.

According to the law, approval could be refused only if a society's bylaws were not in conformity with the law's provisions or if it failed to provide for receipts proportionate to its expected expenditures. The bylaws had to specify, among other things, the conditions and methods of admission and exclusion of members, method of election of members of administrative councils and nature of their powers, rate of contributions, and methods of investing and withdrawing funds.

The law of April 1, 1898, continued, with a few minor amendments, to govern the activities of mutual benefit societies until 1945. Under its influence, approved mutual societies grew in number, but the benefits they furnished remained restricted, and even the relatively small contributions required for membership could not be paid by many industrial workers. Members of the societies appeared to be drawn, in general, from among salaried persons, better-paid skilled workers, and small farmers. The growth of mutual benefit societies for

[8] Since 1903, recognized societies have not been distinguished from approved in official statistical reports, and only one recognized society has been chartered since 1898

[9] In 1900 the French franc had a value of about 19 cents, at present it is worth about 8/10 of a cent.

school children was stimulated markedly after the passage of the law, which placed them in the class of approved societies. First organized about 1880, school societies provided sickness insurance and collected contributions toward retirement pensions for children from 3 to 16 years of age.

Contributions to approved societies varied with the type of society and the nature and amount of benefit offered. A characteristic contribution in 1910 was Fr. 1 monthly per member, with an additional contribution usually required for family coverage. Most of the societies were small, even after 1898, and 90 percent of them furnished sickness benefits, either exclusively or coupled with some other insurance benefit. Although daily cash indemnity was the chief sickness benefit offered by the societies during this period, many gave medical benefits too, and some employed their own doctors.

The tabulation below gives some indication of the growth of approved societies in terms of membership and medical benefits rendered from 1854 to the establishment of the compulsory health insurance system:

Year [1]	Number of approved [2] societies reporting	Insured members [3] as a percent of total population	Medical benefits [4] as a percent of total expenditures for sickness	Year [1]	Number of approved [2] societies reporting	Insured members [3] as a percent of total population	Medical benefits [4] as a percent of total expenditures for sickness
1854	787	0.3	[5] 42.4	1900	9,009	3.7	47.9
1859	2,274	.7	[6] 23.9	1910	15,832	8.0	47.5
1871	4,263	1.4	42.4	1920	15,928	7.9	52.6
1880	4,790	1.8	47.4	1930	18,496	14.4	54.8
1890	6,433	2.4	48.9				

[1] Statistical data on which this table is based are contained in references (*34* and *37*).
[2] Represents societies for adults granting all types of insurance benefits; approximately 90 percent of them gave sickness benefits either exclusively or along with other benefits. From 1854 to 1871, the figures represent all existing approved societies; thereafter, they represent approved adults' societies reporting their operations.
[3] Represents participating members only. From 1880 on, figures used to derive percentages include child members of adults' societies. Figures used for total population represent official annual midyear estimates of the number of French residents.
[4] Total expenditures for sickness by approved adults' societies include: administration, cash benefits, doctors' fees, and drugs. Administrative costs include those for invalidity, old age, and other benefits, as well as sickness insurance, since no separate figures for administration of each type of benefit are available. Medical benefit costs represent the sum of expenditures for drugs and doctors' fees.
[5] Data not available for administrative costs.
[6] Data not available for drug expenditures.

Status Under Compulsory Insurance Law (1928).—The enactment of compulsory insurance legislation in 1928 (modified in 1930) placed voluntary health insurance as administered by mutual benefit societies on a new basis. To comply with the provisions of the law, most of the mutual societies created special funds, legally distinct from their founding societies and federations, which, when approved as official insurance funds, were permitted to administer compulsory

benefits. The parent organizations continued as mutual societies, however, for purposes of granting supplementary voluntary insurance. In addition, separate funds were created by the authorities in each province to administer compulsory benefits to insured persons who did not join a mutual society fund. Both the mutual society funds and the provincial funds were organized under the legal form of mutual benefit societies, although their functions were limited to the provision of compulsory and specific voluntary benefits.

The compulsory social insurance system, which went into effect in 1930, covered, in general, persons from school-leaving age to age 60 (and certain classes of their dependents) employed in commercial, industrial, and agricultural occupations, if their earnings did not exceed a set maximum. It provided cash and medical benefits during illness, and invalidity, maternity, survivors', old age and death benefits. Voluntary insurance with the funds furnishing compulsory sickness insurance was permitted to certain groups not covered compulsorily for these benefits, such as small shopkeepers, artisans, self-employed nonmanual workers, small farmers and sharecroppers—in general, anyone of French nationality depending principally on his work as a means of livelihood, provided that his annual earnings did not exceed the income limit for compulsory insurance. In addition, those not eligible for compulsory insurance were left free to insure themselves with mutual benefit societies, as were those compulsorily insured who wished to procure supplementary benefits. Those voluntarily insured with compulsory insurance funds were required to pay contributions quarterly, the amount of their contributions to be fixed by the insured themselves up to a maximum of 10 percent of their annual earnings but not less than Fr. 240 per year. The insurance funds had to keep separate accounts for voluntarily and compulsorily insured individuals, and were not permitted to guarantee cash sickness benefits in an amount exceeding Fr. 25 per working day to those insured voluntarily.

Voluntary insurance with the compulsory insurance funds, as provided for in the law of 1928, was abolished in 1935 owing to the small number of eligible individuals who had applied for it since 1930. In 1933, for example, only 12,000 persons in nonagricultural occupations were paying contributions for this type of voluntary insurance. Insurance on this basis remained open, after 1935, only to an insured man's nonworking wife and certain classes of agricultural workers and their dependents.

New Laws 1945–46.—With the liberation of France from German occupation in 1944, extensive revisions of the French social insurance system were begun, and voluntary insurance, as well as compulsory, was

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reorganized. As a result of the various laws passed in 1945 and 1946 regulating the provision and administration of insurance benefits, the functions of the funds organized by the mutual societies for administering the benefits of the 1928 law are taken over by newly created primary and regional funds, which are quasi-governmental agencies established on a geographic basis and controlled democratically by their members. Voluntary insurance with these new funds is now limited to two groups: (1) those who, having been compulsorily insured for at least 6 months, cease to fulfill the conditions for compulsory insurance; (2) members of an employer's family who work in his enterprise without pay, on condition that they are not more than 40 years old at the time of application. Contributions for this type of voluntary insurance must be paid monthly for the preceding month to the primary insurance fund nearest the contributor's residence. Failure to pay the contribution for three consecutive months causes the insurance to lapse. With certain exceptions, contributions of voluntarily insured individuals secure coverage for the same dependents as do those of compulsorily insured persons, and the voluntarily insured are entitled to all benefits of compulsory insurance except cash benefits for sickness and maternity.

Although the new legislation extends compulsory social insurance in France to virtually the entire population by abolishing all income limits and most occupational restrictions, some room is still left outside the system for mutual benefit societies to supply additional voluntary benefits to those who desire and can afford them.

A new ordinance redefining the status of mutual benefit societies, passed on October 19, 1945, indicates the areas in which such societies are expected to concentrate their work in the future. Rules for approval and the general administrative and financial powers of societies offering voluntary insurance are not changed very much under the new act; but some of the societies' goals have been substantially altered. What these new objectives will mean in future practice is best exemplified in the types of facilities and services which the societies, under the new law, are expected to provide, with the aid of grants from public funds specifically to encourage their provision. These include dispensaries, maternity clinics, children's consultation bureaus, rest and retirement homes, pharmacies, and dental offices—in general, all types of organizations for prevention, care, and cure of illness. Besides furnishing such services and facilities, the voluntary societies will continue, under the new law, to offer health insurance benefits supplementing those of the compulsory system.

BELGIUM

Origins.—Mutual benefit societies in Belgium stem from the same roots as those of the self-help movement in other countries of Western Europe. Official recognition and national support of the movement in Belgium, however, gave relatively little stimulus to the development of voluntary sickness insurance through these societies until the first decades of the twentieth century. Lacking adequate aid from public funds, gaining relatively little advantage from legal recognition, and developing without any centralized effort toward uniformity of standards, sickness funds led a precarious existence. A Belgian official, in a report to the Third International Congress of Actuaries in 1904, said that they lacked the necessary requirements of a safe and rational organization, adherence to the principle of equal distribution of resources, and adequate accounting systems.

Early in their history, Belgian societies tended toward organization on a geographic rather than an occupational basis, but within each locality, Catholics, socialists, liberals, and independent or "neutral" political groups formed "closed" societies with membership restricted to persons of similar religious or political views. No legislative action was taken to prevent this stratification, though other efforts during the 1900's helped to effect wider distribution of resources and risks.

A commission, appointed by the Belgian Government in 1843 to study the economic conditions of workers, concluded that mutual benefit societies were an essential means of relieving misery. To stimulate their development, a ministerial circular was issued on April 17, 1849, instructing governors and mayors to call meetings of employers and ask them to encourage the formation of these societies. The first Belgian law on mutual benefit societies, enacted 2 years later, permitted them to obtain official recognition and legal status through voluntary registration. Such recognition carried the advantages of exemption from certain taxes, but also imposed several restrictions on societies offering sickness benefits. They were prohibited from insuring any long-term risk, from owning any real estate, from accepting substantial gifts or legacies, and from making loans; and on liquidation, their assets were virtually expropriated by the Government. Few societies applied for registration.

As a stimulus to the mutual aid movement, a Royal decree of April 9, 1862, offered small prizes to societies that submitted annual reports to local authorities and made the best showing. Little was accomplished by this means, but 25 years later, "propaganda" committees, established in each province to further the movement, achieved some success.

Law of June 23, 1894.—The permanent commission on mutual benefit societies, established in the Ministry of Agriculture, Industry, and Public Works in 1851, was then asked to draft a bill for legislative action in the field of mutual aid. The recommendations of this commission, embodied in a bill introduced on May 17, 1890, proposed substantial liberalization of the restrictive provisions of the law of 1851, to permit societies to extend their sphere of activities, acquire administrative autonomy, gain recognition more easily, form federations, and, on dissolution, have the right to divide their assets among members.

These steps were taken in the law of June 23, 1894, which repealed that of April 3, 1851. For approval, a sickness benefit society had to submit its constitution, defining its purpose, and the regulations governing membership, nomination and powers of members who served as administrators, contributions, benefits, financial accounting, administrative procedures, and provisions for dissolution and liquidation of assets. Approved funds were required to invest their reserves in specified banking institutions or securities and had to submit annual reports of receipts and expenditures to the permanent commission. No benefit standards for approval were stipulated, nor were restrictions placed on membership. The approved funds might accept as members any person aged 18 or over and children under age 18 with the consent of their parents or guardians. Married women could enter or retain membership unless their husbands objected in writing. An amendment enacted on March 19, 1898, provided for contributions from public revenues to approved funds and their federations.

Progress During the Early 1900's.—The number of approved sickness funds and their membership increased fairly steadily in the first decade of the twentieth century, particularly in the highly industrialized provinces of Belgium. The Government contribution to these funds was smaller than that granted to approved old-age insurance funds, and voluntary sickness insurance lagged behind old-age insurance. Shortly before the century opened, approved sickness funds represented 97 percent of all approved mutual benefit societies, while about 10 years later they were only 36 percent. According to one authority, the entire membership of sickness funds included only about one-fourth of the Belgian working population, for "only the elite of the working class could afford the cost of sickness insurance."

A significant stage in the development of sickness funds occurred soon after the legal restrictions on the formation of federations were lifted. The primary mutual benefit societies began to federate, and

these federations established reinsurance funds that provided sickness benefits for persons whose illness was of longer duration than the 3 or 6 months for which they could receive benefits from the primary society.

Beginning with 1904, special public grants were paid to these reinsurance, continuation, or invalidity funds, and, an act of May 5, 1912, stipulated more detailed requirements for receipt of these grants. Primary and invalidity benefit societies for Catholic, socialist, liberal, and neutral groups were organized in district federations, which in turn were united in national alliances, leagues, or unions, providing some degree of Nation-wide distribution of risks and resources for each group and a more centralized system of management and supervision.

Perhaps the most significant development in the voluntary system, however, was the stimulus given in the 1920's to the provision of medical and pharmaceutical benefits for insured persons and their dependents. Under provisions of ministerial circulars of February 20, 1920, and December 31, 1922, sickness funds with at least 25 members, which required specified minimum contributions for this family medical care, received Government grants geared to the total amount of members' contributions for this purpose. Many funds were soon established solely for this family medical service. In addition, some primary funds and reinsurance funds, which had formerly limited their benefits to insured contributors or to cash payments, availed themselves of public aid in providing medical benefits for the members' young children, wives, and dependent parents. Of further significance, from the standpoint of the distribution of risks and financial stability of voluntary health insurance, was the act of June 30, 1923, which permitted sickness funds to amalgamate without going through the legal formalities of dissolution and liquidation of their assets.

It is difficult to form a composite picture of Nation-wide developments in the voluntary health insurance offered by mutual aid societies in Belgium over the years. The many different types of societies and the variations among them in risks covered, contributions required, and benefits provided, as well as the lack of comparable or consolidated information reflect their freedom from regulation, standardization, and control. Some funds offered maternity benefits; some provided separate insurance against the risk of tuberculosis; some provided invalidity benefits either directly or through their affiliated funds; some were linked with the national fund for voluntary old-age insurance.

The tabulation below gives, for a series of decades, some indication of trends in coverage and medical benefits under voluntary health

insurance in Belgium. Information on the contribution from public funds is not available:

Year [1]	Number of recognized societies [2]	Members as a per-cent of total pop-ulation [2]	Medical and phar-maceutical benefits as a per-cent of total ex-pendi-tures [3]	Year [1]	Number of recognized societies [2]	Members as a per-cent of total pop-ulation [2]	Medical and phar-maceutical benefits as a per-cent of total ex-pendi-tures [3]
1853	13	([4])	----------	1900	1,687	2.9	23.6
1866	78	0.2	----------	1910	3,109	5.6	----------
1875	171	.5	----------	1920	2,810	19.4	55.6
1886	220	.5	----------	1930	2,939	34.6	68.4
1891	397	.9	20 3	1940	2,527	37.2	73.5

[1] Data computed from figures in references (*40* and *41*).
[2] Data for 1853–86 represent all recognized mutual benefit societies and their active members; for 1891–1910, they represent the number of recognized sickness societies reporting and their active members; for 1920–40, they represent the number of recognized sickness societies reporting, while membership represents the total number of persons eligible for medico-pharmaceutical services.
[3] Total expenditures represent the costs of administration, cash sickness benefits, and medical treatment for reporting societies and those giving medico-pharmaceutical service; expenditures for funeral benefits are excluded.
[4] Less than 1/10 of 1 percent.

The new compulsory social security program, established in Belgium under its law of 1944, cuts across most of the complexities of the voluntary system and bridges many gaps in protection, at least for workers in industrial and commercial employment and the dependents of these workers. Aspects of the mutual aid principle are preserved in the continuance of national unions, district federations, and primary societies in the administration of medical, cash sickness, maternity, and invalidity benefits. Employers and employees, however, contribute toward these benefits by paying a periodic, joint, unified contribution for all components of the national social security program. A national sickness and invalidity insurance fund safeguards the financial structure of the health insurance system, by setting standards for reserves and by distributing public funds toward support of the system.

Voluntary Insurance Under the Compulsory Program.—The new law permits persons who were voluntarily insured in a mutual benefit society affiliated with an approved national union to count periods of such voluntary insurance toward eligibility requirements for maternity benefits when they enter employment covered by the compulsory system. It also provides opportunity for maintaining, through voluntary insurance, an insured status during temporary shifts from covered to noncovered employments. Furthermore, persons in receipt of invalidity or old-age pensions may insure themselves and their dependents for medical benefits under the compulsory system by paying fixed monthly contributions.

Beyond these provisions, the continuance of voluntary health

insurance by these unions and their affiliates would appear limited, for regulations issued by the sickness and invalidity fund prohibit mutual benefit associations used in the compulsory system from providing any additional benefits without special permission. These associations must first build up reserves. Subject to approval by the appropriate national authority, when the reserve for a union exceeds Fr. 30[10] per member, the excess may be used for special medical and hospital facilities for insured persons, and when it exceeds 20 percent of the 3-year average annual income, supplementary benefits may be granted.

Estimates indicate that the compulsory health insurance system at the outset covered some 1.2 million employed persons and their dependents, or about half the total population. Information is not yet available on its extension to other groups of persons, or on the degree to which the compulsory system has affected voluntary insurance against the risks and costs of illness.

SWEDEN

Origins.—In Sweden, as in Great Britain and other countries of Western Europe, the precursors of sickness benefit societies were the medieval guilds. The cooperation of persons with similar occupational or other interests continued after certain guild controls ceased in 1864, and gained new impetus in the 1870's when various clubs, societies, and other associations were formed in large Swedish cities. The main stimulus to health insurance, however, arose from the activities of trade union and temperance societies in the 1880's, for most of these groups provided sickness benefits for their members. Subsequently, many societies were formed solely to give such benefits; furthermore, as industrialization developed, many employers established sickness benefit clubs for their workers.

The first Swedish law on health insurance was enacted on October 30, 1891, and became effective on July 1, 1892. It was based on proposals drafted in 1884 by a committee on workers' insurance. The law made no attempt to force mutual sickness benefit societies into any required pattern, but offered a small contribution from national revenues toward administrative costs of societies that registered and were approved as meeting certain requirements relating to size of membership, fiscal controls, and administrative procedures. Application for registration and approval was to be made to Royal authorities in rural districts, the Governor in Stockholm, and the mayor in other cities.

Basic Changes, 1900-30.—In 1903, the Riksdag called on experts to make a thorough study of voluntary insurance and to recommend steps for control of the "unbusinesslike activities of benefit societies."

[10] The Belgian franc, valued at about \$0 19 in 1900, is now worth about \$0 02

As a result, a bill was introduced on December 2, 1905, setting up more detailed requirements for registration and approval of mutual benefit societies, including sickness funds as well as other groups. No action was taken, however, and when the new Benefit Societies Act of 1912 required all noncommercial mutual insurance societies to register for official approval, those providing sickness benefits were specifically exempted.

The first significant legislative change in the health insurance system was brought about by the act of July 4, 1910, effective January 1, 1911. It was based on proposals introduced on June 30, 1909, by a committee of experts and embodied many recommendations of mutual benefit societies which they believed would strengthen the financial position of small sickness funds. The new law preserved the entirely voluntary aspects of registration and application for approval and left to groups of people the initiative of forming and administering benefit societies for mutual protection. Approval, however, carried more substantial rights as well as more stringent requirements. The contribution from national revenues was greatly increased and divided into three parts, a flat annual sum per member, plus a small amount for each day, excluding Sunday, for which the sickness fund provided as much as Kr. 0.90 [11] for hospital treatment [12] during the preceding year, plus one-fourth of the fund's expenditures for medical fees and medicines.

Approval was accorded only to local sickness funds with at least 100 members (or in very sparsely settled northern areas, a minimum of 25 members), and an approved fund was obliged to liquidate, unless approved for subsequent operation by inspectors, if its membership dropped below the level required for approval and failed to regain that level within 3 months. The regulations of the fund had to indicate the conditions of membership; benefits provided; methods of determining contributions, investing funds, and supervising fiscal management; frequency of general meetings; methods of communicating with members; and provisions for steps to be taken n the event of dissolution. Each fund had to collect fixed contributions from its members in amounts sufficient to meet current expenses and build a necessary reserve. Additional assessment of members was permitted only if the fixed contributions proved insufficient. The law also required central supervision of all approved sickness funds to assure that the objectives of the law were met. At first, the Royal

[11] In 1900, the Swedish krona was worth about $0.27; its present value is about $0.28.

[12] As they have developed in Sweden, nearly all hospitals are public institutions, financed and administered by the county, city, or National Government. Ward care in these institutions is available at little or no charge to any resident of the community served by the hospital. That care, moreover, includes the free services of the staff physicians, surgeons, other specialists, nurses, and technicians. Whether the ward patient is insured in an approved sickness fund or not, the major cost of his treatment is financed from public resources; rich and poor alike use ward facilities.

Bureau of Commerce exercised this supervision, but the function was transferred to the Social Board when it was established in the Ministry of Social Affairs in 1912.

The act of 1910 prohibited membership in more than one approved local fund but set no age, health, occupational, or income restrictions on membership; on the other hand, it made no attempt to eliminate or modify any membership restrictions that approved funds might impose. Approved funds could not expel members, however, because they had reached a given age, suffered from ill-health, or received extensive benefits.

Benefits had to include at least hospital treatment, or medical and pharmaceutical assistance, or—if the member was arranging for medical care himself—a cash benefit of at least Kr. 0.90 a day. The fund was not obliged to provide benefits, however, unless the illness caused appreciable reduction in working capacity, and no cash benefits could be granted unless the illness lasted at least 3 days. The maximum duration of benefits had to be at least 90 days in each 12 months, though this period might be shortened when some specific disease sharply increased morbidity or death rates in a fund's territory.

The first effect of this law was to reduce the number of approved sickness funds, through liquidation of small ones or their amalgamation with others. Continuation funds were set up by groups of small sickness funds to provide a form of reinsurance, so that benefits could be payable for a longer period than the small fund could finance. For approval, these continuation funds had to have at least 500 members.

Legislation in the 1930's.—During 20 years of operation under the law of 1910, substantial grounds for modification of the Government-supported voluntary health insurance system were revealed. A series of laws issued on June 26, 1931, radically revised the system by instituting changes to be effected in 1932, 1935, and 1938. Under the new statutes, the regulations of an approved sickness fund had to specify that admission would be denied to all except healthy persons aged 15–50 (40 could be and usually was the upper age limit, however) who were not suffering from a defect that would or might substantially reduce their working capacity or call for extensive medical care. No approved fund could deny admission to any resident of the area in which it operated if the applicant was in good health, and aged 15–40. No income restriction was placed on admission to membership or insurance for cash benefits, but persons whose income and property assessment for tax purposes exceeded Kr. 8,000 could not insure for medical benefits in approved funds. (This income restriction was abolished at the end of 1944.)

An approved fund had to furnish sickness benefits in the form of

compensation for costs of medical care and daily cash allowances and maternity benefits. Compensation for a doctor's care had to be without time limit, but cash sickness and hospitalization benefits might be limited to a period of 2 years for one continuous illness. Cash sickness benefits could not be more than Kr. 6 a day unless the Government authority granted special permission, and these benefits could not be paid unless the illness caused at least one-fourth reduction of working capacity or unless a physician certified that the patient should refrain from work. Members who insured their children under age 15 could receive compensation for the medical expenses of their children's illness. The form of medical benefits was, in general, free hospitalization and reimbursement, up to two-thirds of the amounts set in an approved fee schedule, for doctor's fees (including the doctor's mileage for home visits) and costs of medicines. An approved sickness fund's right to provide funeral benefits was withdrawn.

In the changes of the 1930's, competition among funds was lessened by stipulation that, in general, a given area could have only one approved fund, though exception was made for factory or other employer funds operating for a single establishment or industry. Each local fund had to be attached to a central fund for the area, and each member of the local fund had to be indirectly affiliated with the central fund, which paid benefits, as the former continuation funds had done, after the member's rights in the local fund were exhausted. The central funds also provided all benefits for their "direct members"—persons living in a locality without a local fund. These organizational changes virtually prohibited approval of closed funds, i. e., those which limited their membership to persons of specified sex, political, or social group.

In 1938, supervision of the voluntary health insurance system was transferred to the Pension Board in the Ministry of Social Affairs. With increasing contribution from national revenues and special support for maternity benefits and obstetrical care, the voluntary system continued to expand (chart 1). By 1938, all sickness funds had to register, regardless of their size, but only those that wanted to participate in the national system applied for approval and financial support from public revenues.

The sickness benefit societies outside the approved system numbered 486 at the end of 1944, and they had 466,000 members, as compared with 566 societies with 262,000 members at the turn of the year 1935–36. The assets of these societies increased in the same period from Kr. 10,000,000 to Kr. 20,700,000, including the assets for paying funeral benefits which were provided by all but 160 of these societies at the end of 1944.

Voluntary Insurance Under the Compulsory System.—Proposals for compulsory health insurance introduced in the Riksdag as early as 1910, and again in 1919, 1920, and 1938 gained relatively little support, for the people of Sweden preferred to avoid any aspect of compulsion in this field of social insurance. At the end of 1946, however, after a report presented by a committee that started its investigation in the autumn of 1938, a compulsory health insurance law was passed, and was approved by the Crown on January 3, 1947, to become effective July 1, 1950. This new law will provide health insurance coverage for the entire population.

Public revenues will continue to support the voluntary health insurance movement in some degree. Central funds may be approved to receive a Government contribution amounting to one-fifth of their annual expenditures for supplementary benefits through voluntary insurance. Only persons who are in good health and have not reached age 55 may be insured for these supplementary benefits, and they must serve a 3-month qualifying period if they enter without medical examination. The subsidy for supplementary medical benefits will be only for physiotherapy, and the supplementary cash sickness benefit will be limited to an amount which will prevent the insured person from receiving in a day of illness more than 1/360 of his annual income from gainful work. The comprehensive coverage and protection of the compulsory system, and the parallel proposal for universal, free hospitalization and free or cheaper drugs and medicines, would seem to leave a relatively narrow field for voluntary insurance for medical care.

DENMARK

Origins.—When the sickness benefit societies of the guilds were abolished in Denmark by an act which became effective on January 1, 1862, the journeymen's clubs were permitted to form voluntary societies to which they could transfer their health insurance activities. Many voluntary sickness funds were thus established and, by 1885, they and similar organizations formed a country-wide network with some 120,000 members. Most of the members were in the low-income groups, but many wealthier persons, to give support to the movement, contributed as honorary members. Some municipalities granted these societies official recognition and financial aid. In Copenhagen, for example, when need was proved, members of the recognized societies received treatment at reduced rates in the municipal hospital [13] and free medical treatment for their wives and children. Many of the societies, moreover, had arranged with physicians for service at low charges. In the main, however, the regular

[13] Hospitals in Denmark are administered and financed as in Sweden, see footnote 12

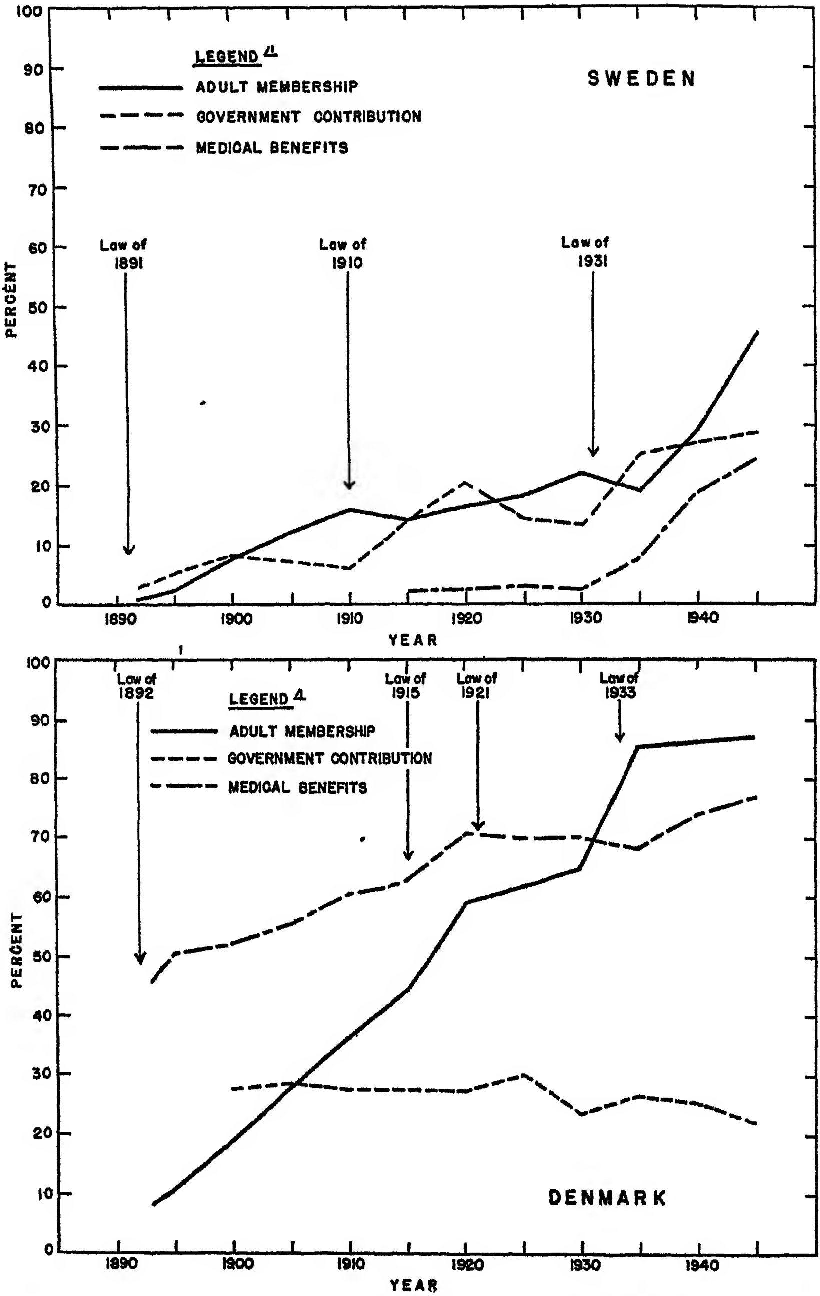

CHART 1.—Trends in membership, Government contribution, and medical benefits under voluntary insurance administered by approved sickness funds in Sweden [2] and Denmark.[3]

[1] The curve for adult membership represents the number of members aged 15 and over, shown as a percent of the total population of that age group

The curve for Government contribution represents the amount paid to approved sickness funds by the

(Continued on page 759)

contributions of members were not sufficient to finance sickness benefits, and money to cover deficits had to be raised by other methods.

Meanwhile, the Danish Government had appointed four successive committees, in 1861, 1866, 1875, and 1885, to study sickness insurance. The report of the last, issued on October 31, 1887, recommended that the voluntary sickness benefit funds should be used as the basis of a national organization, through formal recognition and contributions from national revenues, under certain standards and controls. These recommendations were incorporated in the Sickness Fund Act of April 12, 1892, which became operative on August 1 of the same year.

The act of 1892 provided for voluntary registration of sickness funds. Approval could be granted to voluntary, self-governing societies with 50 or more members, on condition that membership was open to anyone in the locality, trade, or establishment who was "without means," [14] aged 15–45, and not suffering from chronic or incurable disease. The act further specified that no one could belong to more than one approved fund or, through additional insurance in a nonapproved fund, acquire rights to benefits exceeding his earnings.

In this initial statute, the Danes set certain minimum benefit standards for approval: free medical care was required for insured persons and their children under age 15; cash benefits were set at a minimum of Kr. 0.40 a day, but not more than Kr. 2,[15] payable for as much as 13 weeks. The fund was required to operate on an economically sound basis, and to permit inspection by public authorities. The Government inspector-general was to be assisted by a committee of delegates elected by the managing boards of sickness funds themselves. The Government contribution to approved funds was to represent Kr. 2 a year per member, plus one-fifth of the annual contributions of members. The intent of the law was that this subsidy would at least cover the fund's expenditures for medical care.

There was no rush for registration and approval. Many of the richer funds were already granting benefits in excess of the minimums, and they resented being classed with poorer ones. In addition, considerable apprehension over possible "interference and control" was

[14] The Danish word "ubemidlede" is variously translated as "impecunious," "unpropertied," or "moneyless." In application it connotes persons dependent on wages, salary, or other earnings from gainful work, whose income is not above the average for full-time skilled employment, and whose property or capital does not exceed certain limits set every 3 years for various types of localities. It does not mean indigent or needy, but designates, rather, persons with average incomes.

[15] In 1900, the Danish krone had a par value of about $0.27; at present it is worth about $0.21.

National Government, shown as a percent of the funds' total income from members' contributions, National and local governments, interest on reserves, and miscellaneous sources.

The curve for medical benefits represents the amounts paid by approved sickness funds for medical and hospital treatment, shown as a percent of total expenditures for cash sickness and cash maternity benefits, medical benefits, and administration; expenditures for funeral benefits are excluded. The medical benefits do not include the share of medical expenses for which the insured person is not reimbursed by the sickness fund or the hospital costs for insured persons which were financed directly from public revenues.

[2] Data for Sweden were compiled from references (*7, 10, 44, 47, 49*).

[3] Data for Denmark exclude State-inspected funds for persons of higher income level, and the fund for employees of the railways; membership includes passive as well as active members; the data were compiled from references (*7, 10, 52, 54, 55, 57*).

expressed. It was clear, however, that aid from public funds was needed, since few sickness funds were in sound financial position, many had high proportions of members in older age groups, and contribution rates were too high for the poorest persons to afford. Within a few years the number and membership of approved sickness funds rose sharply (chart 1).

No small part of the success in removing antagonism and fear is ascribed to the tact and efficiency of the first Inspector-General, Th. Sörensen, a practicing physician, and the committee which worked with him. Confidence of the sickness fund directors and members was gained through meetings and discussions of policies and methods, and plans were formulated and placed in operation in a relatively short time. Most funds were small; more effective distribution of risks was effected by their affiliation with central unions which provided reinsurance for long-term illnesses such as tuberculosis and mental diseases. These central unions also drew up agreements with doctors of the area for the provision of medical services.

Changes in 1915–30.—A new law enacted on May 10, 1915, and effective in 1916, replaced that of 1892 but preserved its main features. The Government contribution to approved funds was increased to one-fourth of the fund's expenditures for statutory benefits; communes were authorized to pay the membership dues of needy persons, and were required to offer hospitalization for sickness fund members at reduced rates. It was also incumbent on communes to provide free transportation to members in rural areas for visits to doctors, if the patient lacked horse and wagon, and to furnish transportation for doctors and nurses in their calls at insured persons' homes; in urban areas, they had to furnish transportation to the hospital if a doctor indicated the necessity.

Under the new law, approved sickness funds could not deny admission to persons with chronic diseases or defects, if other conditions of admission were met, but benefits could be withheld during periods of illness resulting from the chronic ailment. Sickness funds were also authorized to admit as "passive" members (i. e., contributors without benefit rights) persons whose economic status was above the level for active membership.

A significant change in the health insurance program resulted from the establishment of a contributory invalidity insurance system, under the law of May 6, 1921, which resulted in an amended sickness insurance law of June 21, 1921, effective on October 1 of the same year. As of that date, approved sickness funds had to admit as active members persons "without means" who suffered from chronic or incurable diseases or defects, if such persons were capable of any work and were not suffering from some temporary illness or an acute phase of their chronic condition. To reduce the financial burden on funds which would result from admission of these poor risks, the National Government and communes would each bear three-eighths

of the costs of benefits to these active members in excess of the fund's average annual expenditures for benefits to all other active members. The membership contribution from national revenues was increased to Kr. 3 per year per member, and the Government's share of one-fourth the fund's expenditures for statutory benefits was extended to include the same share of expenditures for optional benefits, such as medicines, dentistry, nursing, and care in convalescent homes.

Under the law of 1921, a maternity benefit of at least Kr. 1 a day was required of all approved funds and was payable for as much as 10 days if the insured woman was obliged to stay in bed that long. The act also set the minimum cash sickness benefit at Kr. 0.50 a day, and the maximum at Kr. 6, or not more than four-fifths of the insured person's earnings. The required duration of these benefits was extended to 26 weeks for illness which continued that long.

Financial requirements for approved sickness funds under the law of 1921 specified that each fund must levy contributions at such rates that, in conjunction with other income, they would suffice to meet obligations and form a reserve equal to average annual expenditures during the preceding 3 years in excess of the Government contribution. The grant from national revenues was greatly reduced by the act of July 14, 1927, under which the membership contribution reverted to Kr. 2, and the Government's share of benefit expenditures became a flat annual amount, rather than 25 percent of the fund's outlay. Furthermore, if the official authority [16] approved and the weak financial position of a sickness fund warranted the action, members could be required to bear as much as one-fourth of the costs of doctors' care.

An act of March 27, 1929, provided Government inspection and control of voluntary health insurance for persons with "means," but authorized no financial support from public funds. Under this system, persons whose economic status precluded admission to, or continuance of active membership in, the subsidized sickness funds could become active or passive members of separate benefit societies or separate departments of the subsidized funds. If they insured for benefits, active members with "means" paid higher contributions to compensate for the lack of Government contribution on their behalf. In general, their benefits consisted of cash sickness benefits and partial reimbursement of medical expenses.

New Laws Enacted in 1933.—On May 20, 1933, the Rigsdag approved four new statutes, providing a comprehensive social security

[16] The Sickness Fund Inspectorate (later Directorate) was first placed in the Ministry of Interior, where it remained until it was transferred to the Ministry of Social Affairs, established by an act of April 23, 1924. The latter Ministry was abolished by an act of December 14, 1926, establishing the Ministry of Health, which, in its brief existence, was responsible for approval and supervision of sickness funds. The act of April 30, 1929, subsequently abolished the Ministry of Health and assigned part of its functions to a Board of Health in the Ministry of Interior and transferred its sickness fund responsibilities to the reestablished Ministry of Social Affairs.

system and embodying provisions for health, invalidity, and old-age insurance, workmen's compensation, unemployment insurance, and public assistance. The changes effected in the voluntary health insurance program related more to integration of that system with compulsory invalidity insurance and noncontributory old-age pensions than to substantive amendment of the earlier provisions for health security. The new act, however, limited the duration of sickness benefits to 60 weeks in three consecutive fiscal years, by providing that a member would be transferred from active to passive status at the end of that benefit period.

Insurance for medical, cash sickness, and maternity benefits continued on a voluntary basis, but an element of compulsion was introduced by requiring that all persons of working ages who could make some contribution toward self-support should be at least passive members of subsidized sickness funds or Government-inspected nonsubsidized benefit societies. If they failed to join one of these institutions, they were subject to fines for contribution arrears and were ineligible for invalidity benefits or old-age pension. Public assistance to such persons, moreover, involved a loss of the right to vote.

Voluntary Health Insurance of the Present.—Although the reform of 1933 required nearly all persons of working age in Denmark to maintain membership in a mutual benefit society of the health insurance program, that program remained and still is nominally voluntary. Compulsion relates only to invalidity insurance, toward which persons must contribute about Kr. 10 a year. Since that compulsory contribution is normally collected only by the sickness funds of the health insurance system, each contributor must be either an active or a passive member of one of those funds. By paying about Kr. 42 more a year to a nonsubsidized fund, a person whose economic status is above that which permits active membership in a subsidized fund may insure himself and his young children for medical benefits in a Government-inspected mutual benefit society. When his "means" do not preclude active membership in a subsidized fund, he and his children can be insured for medical benefits if he pays about Kr. 20 a year more than he is obliged to pay for invalidity insurance. In that event, he will also be entitled to a small cash benefit to compensate for loss of earnings during his own illness. Of the 2,890,000 persons contributing toward invalidity insurance at the end of 1944, more than 90 percent had voluntarily insured themselves and their children under the health insurance system.

NETHERLANDS

Origins.—Voluntary health insurance, in the form of relief funds for sick workers organized by the medieval guilds, began in the Netherlands as early as the fifteenth century. Although these funds

gave some assistance to their members when they were ill, the primary purpose of such organizations was at first religious. With the advent of the Reformation, however, most of the craft guilds abandoned religious activity and began to develop as mutual aid institutions for the relief of sickness. These institutions could be founded, originally, only with the permission of the communal authorities, who exercised strict supervision over their administration. The extension of the effects of the French Revolution to the Netherlands, toward the end of the eighteenth century, broke the virtually sovereign power of the individual municipalities, and the local guilds, strongly dominated as they were by the communal authorities, began to disintegrate.

Despite popular demand, beginning in the nineteenth century, for the reestablishment of mutual benefit associations, no action was taken in this direction by the Dutch Government until 1820, when a Royal decree gave communal authorities permission to encourage the formation of new mutual sickness insurance organizations. Soon after, under the Commercial Code of 1838, mutual insurance societies were "recognized." These attempts to stimulate the growth of mutual insurance were not very successful. The new mutual benefit societies were left largely to their own devices until 1855, when an act was passed requiring certain types of mutual societies to obtain Government approval of their regulations in order to receive legal status. In 1864, another act expressly exempted mutual insurance societies from the legal formalities imposed on other organizations desiring to obtain legal status. From that time on, the new mutual insurance movement made rapid headway.

The chief aim of these early mutual funds which furnished sickness benefits was daily cash payments to members who lost time from work because of illness. It was not until late in the nineteenth century that mutual societies began, to any great extent, to furnish medical benefits to their members.

Developments From 1900 to 1930.—During the first decade of the twentieth century, the need for further legal regulation of sickness insurance was recognized. The Dutch Parliament, in 1913 adopted an act providing compulsory insurance for cash sickness benefits for some sections of the population. This act was never put into effect, however, because the Government which succeeded to power in 1915 considered it so impracticable as to be unenforceable; sickness insurance in the Netherlands, therefore, continued to remain largely in the hands of the mutual insurance funds.

Shortly before the first World War, in 1913, the Dutch medical profession began setting up voluntary sickness funds administered by physicians. Management of these funds was usually vested in a board composed of doctors, pharmacists, and elected representatives of the insured members. A certain amount of uniformity was intro-

duced into the administration of medical benefits as a whole by the Medical Association when it began seriously to interest itself in sickness insurance. In many towns it was able to induce all local sickness insurance societies to sign a contract providing for uniform fees for doctors, uniform contributions and income limits for members, and a maximum in the number of families treated by any one physician.

By 1930, shortly after the passage of the Sickness Act of 1929 which finally established compulsory insurance for cash benefits, there were five major classes of sickness funds furnishing voluntary health insurance in the Netherlands: mutual, employer, commercial, "doctor" (i. e., funds run by the Medical Association), and miscellaneous. None of them, however, except the few run for profit and organized as limited companies, was legally bound to comply with any financial or accounting condition.

Characteristic of the early organization of voluntary health insurance in the Netherlands was the separation, carried over into the compulsory system, between mutual institutions granting daily cash benefits and those giving medical benefits. Before the compulsory system for cash benefits was established, funds granting such benefits ordinarily admitted to membership persons of either sex belonging, in general, to the class of industrial workers. Most funds offering cash benefits set a minimum age limit for membership, usually varying between 14 and 18, and a maximum limit, usually 45. Funds granting medical benefits usually insured the family of the contributor, whereas cash benefit funds covered only the insured person himself. A further difference between the two groups of funds was that persons could join several funds granting cash benefits, but only one for medical care insurance. The number of persons insured for the latter type of benefit was estimated at 1,250,000 in 1927, or about one-sixth of the total population.

Developments Under Compulsory Insurance: 1930 to the Present.—The Sickness Law of 1929, providing for cash benefits for wage losses due to sickness, went into effect on March 1, 1930. Covered by the statute (as amended in 1929, 1930, and 1934) were, in general, employed persons with a wage or salary of not more than G. 3,000 (now G. 3,750) [17] per year. Cash benefits for illness under the law, payable for a maximum of 26 weeks, amounted to 80 percent of the average daily wage earned by the insured person during the preceding 13 weeks, and a maximum daily wage was set, on the basis of which benefits were to be calculated. Voluntary insurance for cash benefits with the public carriers (i. e., funds set up by the 24

[17] In 1900, the Netherlands guilder had a value of about $0 40, at present it is worth about $0 38.

regional labor boards) [18] of compulsory insurance was permitted under the law to some self-employed persons and to employees who had either (1) ceased to fulfill the conditions for compulsory insurance; or (2) had been insured either voluntarily or compulsorily in foreign countries and had adopted the Netherlands as their permanent place of residence. Contributions and benefits for voluntarily insured persons under the 1929 law are fixed by the labor boards for each individual when he joins the system.

Although medical benefits remained on a voluntary basis when the compulsory cash benefit system became effective, most of those subject to the compulsory system were virtually forced to become members of a medical benefit fund by a provision in the 1929 law requiring proof of membership in such a fund, or of ability to obtain medical care elsewhere, before eligibility for cash benefits could be established. This provision further stimulated the growth of voluntary medical care insurance in the Netherlands. The Central Statistical Office reported that 439 voluntary medical benefit funds existed in the country on January 1, 1936; they had a membership of 3,338,000, including dependents entitled to benefits. The largest of them, run by the Netherlands Medical Association, had 81 branches and insured 32.8 percent of all persons covered by voluntary insurance for medical benefits. Insurance with these funds was usually open to anyone whose income did not exceed limits fixed by each fund individually. Most of them also fixed an age (usually 16) above which young members had to pay the full adult contribution. Contributions varied according to whether a specified fund operated in an urban or rural area.

Most of the sickness funds had started by providing only general practitioner's care, but other benefits such as drugs, specialist's care, dental care, midwife's assistance, and, in some cases, hospitalization and surgical appliances had been added in turn, so that by the time of the German invasion of the Netherlands in 1940, many of the funds giving medical care insurance were offering all these benefits.

When medical benefit insurance was finally made compulsory in 1941, with the passage of the Sickness Funds Decree, many of the existing voluntary sickness funds furnishing medical benefits were recognized by the Government as "general sickness funds" for the purpose of administering the new compulsory system. The number of funds providing voluntary medical benefits had grown by this time to more than 600, and about 4,000,000 persons (including dependents

[18] Approved industrial associations—nonprofit occupational funds established jointly by organizations of employers and employees—were also established by the Sickness Law. They administer by far the larger share of compulsory cash benefit insurance, but do not insure persons voluntarily for cash benefits, as do the labor boards.

of contributors) were eligible for these benefits. Only those funds, however, which offered benefits specified by law were accepted into the compulsory system.

The new law covered compulsorily for medical benefits all those, in general, subject to the cash benefit provisions of the Sickness Law of 1929. Contributions also provided coverage for certain classes of the insured persons' dependents. Medical benefits included general practitioner's care; surgical, obstetrical, and other specialist's treatment; hospitalization for 42 days; all necessary medical and surgical appliances; certain types of dental treatment; ambulance service; and part of the cost of care in a tuberculosis sanitarium. Voluntary insurance for medical benefits with the general sickness funds was permitted to the self-employed under the same conditions as for cash benefits. A lower limit of membership of 2,000–3,000 persons was prescribed for recognized general sickness funds, and it was required that compulsory and voluntary insurance accounts maintained by the same fund be administered separately.

Voluntary insurance for both cash and medical benefits remains extensive in the Netherlands, entirely outside the compulsory system. Such insurance is usually bought either by those classes of the population not covered by the compulsory insurance laws or by those under the compulsory program who desire supplementary benefits. Neither compulsory nor voluntary sickness insurance receives, or ever has received, a contribution from public funds in Holland. A total of about 2,550,000 people, or nearly one-third of the Dutch population, was insured voluntarily for sickness benefits in December 1945.

Plans are now being discussed for a further extension of compulsory health insurance to include the provision of medical benefits for low-income self-employed persons.

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INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED MAY 3, 1947

Summary

A total of 3,586 cases of influenza was reported for the week, as compared with 8,037 last week and a 5-year (1942–46) median of 1,426. While the current total is less than half that of last week, it is more than twice the number reported for any corresponding week of the past 5 years. Only 5 States reported more than 85 cases, and only 3 more than 152—Virginia (893, last week 2,885), South Carolina (652, last week 914), and Texas (938, last week 1,459). Of the 290,376 cases reported for the year to date, 249,785, or 86 percent, occurred in the 9 weeks since March 1.

Of 9 cases of smallpox reported for the week, 3 occurred in Wisconsin, 2 in New York City (the first reported since April 9, bringing the total for the State to 14, with 2 deaths), 2 in Kentucky, and 1 each in Indiana and New Mexico. The total for the year to date for the entire country is 111, as compared with 191 for the same period last year and a 5-year median of 213.

Of 25 cases of poliomyelitis reported for the week (last week 28, 5-year median 23), 6 occurred in New York and 5 in California. No other State reported more than 2 cases. The lowest weekly total so far this year (22 cases) was reported for the week ended April 5, 3 weeks later than the approximate average date of seasonal low. The total reported since the average low date (week ended between March 15 and 21) is 194, as compared with 207 for the same period last year and a 5-year median of 153.

A total of 9,750 cases of dysentery (amebic, bacillary, and unspecified, currently slightly below the combined median figures) has been reported for the year to date, as compared with 7,798 for the corresponding period last year and an average of 7,169 for the 4 years 1943–46.

Deaths recorded for the week in 93 large cities of the United States totaled 8,977, as compared with 9,434 last week, 8,974 and 8,920, respectively, for the corresponding weeks of 1946 and 1945, and a 3-year (1944–46) median of 8,922. The cumulative total is 179,924, as compared with 178,222 for the same period last year.

Telegraphic morbidity reports from State health officers for the week ended May 3, 1947, and comparison with corresponding week of 1946 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46
	May 3, 1947	May 4, 1946		May 3, 1947	May 4, 1946		May 3, 1947	May 4, 1946		May 3, 1947	May 4, 1946	
NEW ENGLAND												
Maine	1	5	0	4	-------	-------	134	213	142	0	3	2
New Hampshire	0	0	0	-------	-------	-------	4	60	23	0	1	0
Vermont	0	2	0	-------	-------	-------	192	25	145	0	0	0
Massachusetts	9	4	4	-------	-------	-------	461	2,743	1,305	1	1	7
Rhode Island	1	4	1	-------	-------	-------	182	28	28	0	1	1
Connecticut	1	2	2	9	-------	-------	842	476	476	1	2	2
MIDDLE ATLANTIC												
New York	20	15	15	[1] 6	[1] 7	[1] 7	531	4,757	1,624	8	11	19
New Jersey	15	6	5	4	6	4	420	4,743	1,252	2	3	4
Pennsylvania	17	13	8	([2])	[2] 1	[2] 1	305	4,320	1,678	3	7	13
EAST NORTH CENTRAL												
Ohio	9	12	8	8	3	7	920	734	591	2	6	8
Indiana	5	14	3	4	4	4	111	610	261	3	1	2
Illinois	2	4	5	12	2	5	185	1,022	710	4	8	15
Michigan [3]	3	5	5	16	-------	1	128	1,913	1,067	1	4	4
Wisconsin	1	2	0	24	27	38	437	3,980	1,854	1	1	1
WEST NORTH CENTRAL												
Minnesota	9	11	3	2	-------	-------	460	52	390	0	3	3
Iowa	1	7	2	-------	-------	-------	127	281	259	1	1	1
Missouri	1	4	2	3	1	1	26	170	183	5	4	4
North Dakota	1	1	1	6	-------	27	9	-------	6	1	0	0
South Dakota	1	1	0	-------	-------	-------	71	55	39	0	0	0
Nebraska	0	1	3	8	2	3	11	303	220	1	0	0
Kansas	4	10	5	2	-------	-------	13	514	557	2	0	2
SOUTH ATLANTIC												
Delaware	1	0	0	-------	-------	-------	2	66	30	0	0	1
Maryland [3]	1	9	7	2	4	6	52	716	500	0	1	8
District of Columbia	0	0	0	-------	-------	-------	25	384	121	0	0	2
Virginia	3	10	4	893	106	143	282	608	452	2	1	7
West Virginia	1	7	5	24	3	13	31	45	52	7	0	2
North Carolina	9	4	4	-------	-------	1	115	491	491	3	1	3
South Carolina	4	2	2	652	150	207	277	271	141	1	1	3
Georgia	0	3	2	41	1	2	107	94	128	1	1	1
Florida	4	3	3	78	-------	3	60	209	209	1	1	3
EAST SOUTH CENTRAL												
Kentucky	6	2	2	6	3	7	9	762	153	4	4	3
Tennessee	5	3	4	83	13	18	104	237	196	2	3	4
Alabama	0	0	5	127	21	21	285	212	198	2	0	3
Mississippi [3]	3	1	5	45	-------	-------	23	-------	-------	0	0	4
WEST SOUTH CENTRAL												
Arkansas	2	1	2	152	21	21	72	208	122	2	2	2
Louisiana	4	4	4	9	-------	4	45	84	124	3	0	2
Oklahoma	0	2	4	85	21	31	6	323	176	1	2	2
Texas	17	23	23	938	439	439	414	1,898	1,293	4	8	9
MOUNTAIN												
Montana	0	0	1	42	-------	5	140	54	81	0	0	0
Idaho	0	4	1	21	19	2	1	140	58	0	1	0
Wyoming	1	1	0	1	-------	-------	15	91	91	0	0	0
Colorado	9	4	4	74	1	18	141	446	299	0	0	1
New Mexico	1	4	1	12	1	1	62	117	35	0	0	0
Arizona	0	1	1	85	32	42	61	206	127	0	0	0
Utah [3]	1	0	0	28	2	5	10	388	267	0	0	1
Nevada	0	0	0	-------	-------	-------	-------	7	16	0	0	0
PACIFIC												
Washington	0	8	7	11	-------	-------	47	463	377	3	5	3
Oregon	2	0	1	36	4	14	33	338	191	0	0	3
California	13	26	20	33	15	29	240	3,976	3,612	7	8	15
Total	188	245	192	3,586	909	1,426	8,228	39,902	26,032	79	96	158
18 weeks	4,821	6,425	5,070	290,376	182,740	72,364	107,221	419,130	340,866	1,596	3,171	4,167
Seasonal low week [4]	(27th) July 5–11			(30th) July 26–Aug. 1			(35th) Aug. 30–Sept. 5			(37th) Sept. 13–19		
Total since low	12,387	18,069	13,811	323,351	544,988	108,226	130,108	445,254	378,879	2,568	4,675	6,619

[1] New York City only. [2] Philadelphia only.
[3] Period ended earlier than Saturday.
[4] Dates between which the approximate low week ends. The specific date will vary from year to year.

Telegraphic morbidity reports from State health officers for the week ended May 3, 1947, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever [5]		
	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46
	May 3, 1947	May 4, 1946		May 3, 1947	May 4, 1946		May 3, 1947	May 4, 1946		May 3, 1947	May 4, 1946	
NEW ENGLAND												
Maine	0	0	0	10	18	18	0	0	0	1	1	0
New Hampshire	0	0	0	8	3	11	0	0	0	0	0	0
Vermont	0	1	0	6	6	9	0	0	0	0	0	0
Massachusetts	0	0	0	92	191	309	0	0	0	4	2	0
Rhode Island	0	0	0	9	8	16	0	0	0	0	1	0
Connecticut	2	0	0	30	62	62	0	0	0	0	0	1
MIDDLE ATLANTIC												
New York	6	1	1	355	511	553	2	0	0	5	1	2
New Jersey	0	0	0	120	165	153	0	0	0	0	2	0
Pennsylvania	0	0	0	204	436	436	0	0	0	5	6	6
EAST NORTH CENTRAL												
Ohio	1	0	1	231	305	320	0	1	0	12	4	4
Indiana	0	0	0	77	73	78	1	3	3	2	0	0
Illinois	0	0	0	99	198	198	0	0	0	17	1	2
Michigan [3]	1	0	0	114	176	176	0	0	0	3	1	1
Wisconsin	0	0	0	66	101	193	3	1	1	1	0	0
WEST NORTH CENTRAL												
Minnesota	0	0	0	41	44	72	0	0	0	1	0	0
Iowa	1	1	0	23	61	57	0	4	1	0	0	0
Missouri	0	2	0	17	22	55	0	0	0	3	0	0
North Dakota	2	0	0	4	9	17	0	0	0	0	0	0
South Dakota	0	0	0	4	7	19	0	0	0	0	0	0
Nebraska	0	0	0	22	27	27	0	0	0	1	0	0
Kansas	0	0	1	40	71	71	0	0	0	1	0	0
SOUTH ATLANTIC												
Delaware	0	0	0	4	4	5	0	0	0	0	1	0
Maryland [3]	0	0	0	41	78	136	0	0	0	0	3	2
District of Columbia	0	0	0	11	13	22	0	0	0	0	0	0
Virginia	0	1	0	20	61	61	0	0	0	0	0	1
West Virginia	0	0	0	14	22	25	0	0	0	1	0	1
North Carolina	1	1	0	20	44	37	0	0	0	0	1	2
South Carolina	0	0	0	3	6	4	0	0	0	1	0	1
Georgia	0	1	1	6	9	9	0	0	0	0	5	2
Florida	2	4	3	3	6	5	0	0	0	0	0	2
EAST SOUTH CENTRAL												
Kentucky	0	0	0	24	25	45	2	0	0	3	0	1
Tennessee	0	0	0	23	29	41	0	0	0	0	1	1
Alabama	0	0	0	9	7	11	0	0	0	1	0	2
Mississippi [3]	0	0	0	7	2	5	0	0	0	2	3	1
WEST SOUTH CENTRAL												
Arkansas	0	0	0	2	20	7	0	0	0	1	2	2
Louisiana	0	1	0	5	7	6	0	0	0	2	0	2
Oklahoma	0	0	0	4	8	12	0	0	0	0	1	0
Texas	2	2	3	15	34	48	0	0	0	6	6	6
MOUNTAIN												
Montana	0	0	0	3	10	17	0	1	0	0	0	0
Idaho	1	0	0	3	8	31	0	0	0	0	1	0
Wyoming	0	0	0	7	12	16	0	0	0	0	0	0
Colorado	0	2	0	45	19	48	0	0	0	0	0	0
New Mexico	1	1	0	9	9	9	1	0	0	0	1	1
Arizona	0	1	0	7	14	13	0	0	0	0	0	0
Utah [3]	0	0	0	18	22	22	0	0	0	0	0	0
Nevada	0	0	0	1	2	0	0	0	0	0	0	0
PACIFIC												
Washington	0	1	0	22	20	37	0	7	0	2	0	0
Oregon	0	0	0	16	43	23	0	0	0	1	5	0
California	5	3	3	130	197	197	0	0	0	6	3	3
Total	25	23	23	2,047	3,225	3,859	9	17	17	82	52	54
18 weeks	820	673	455	47,007	63,145	71,761	111	191	213	820	897	1,049
Seasonal low week [4]	(11th) Mar. 15–21			(32nd) Aug. 9–15			(35th) Aug. 30–Sept. 5			(11th) Mar. 15–21		
Total since low	194	207	153	73,693	101,716	110,082	165	267	330	335	422	444

[3] Period ended earlier than Saturday.
[4] Dates between which the approximate low week ends. The specific date will vary from year to year.
[5] Including paratyphoid fever reported separately, as follows: Maine 1; Massachusetts 4 (salmonella infection); New York 3; Nebraska 1; Texas 2; California 4.

Telegraphic morbidity reports from State health officers for the week ended May 3, 1947, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Whooping cough, Week ended— May 3, 1947	Whooping cough, Week ended— May 4, 1946	Whooping cough, Median 1942-46	Week ended May 3, 1947: Dysentery, Amebic	Dysentery, Bacillary	Dysentery, Unspecified	Encephalitis, infectious	Rocky Mt. spotted fever	Tularemia	Typhus fever, endemic	Undulant fever
NEW ENGLAND											
Maine	31	36	36								1
New Hampshire	3	5	3								
Vermont	7	13	21								3
Massachusetts	104	135	136		1						3
Rhode Island	24	13	14								
Connecticut	41	52	29		1						2
MIDDLE ATLANTIC											
New York	174	135	278	4	1		1				5
New Jersey	145	132	132			1					
Pennsylvania	158	102	208								1
EAST NORTH CENTRAL											
Ohio	176	98	154								2
Indiana	42	28	28				1				
Illinois	102	99	99				8				11
Michigan [3]	260	132	132	2							7
Wisconsin	153	85	85								22
WEST NORTH CENTRAL											
Minnesota	32	9	12								4
Iowa	21	20	18								11
Missouri	22	8	8								
North Dakota	2	1	11								
South Dakota											2
Nebraska	37	2	5	1							2
Kansas	25	25	36								
SOUTH ATLANTIC											
Delaware	5	4	1								
Maryland [3]	80	21	52								
District of Columbia	9	12	12								
Virginia	85	36	55			83			1		1
West Virginia	47	32	31								
North Carolina	66	95	115						1		1
South Carolina	100	31	67	6	9					1	
Georgia	27	18	14						2	4	4
Florida	77	16	42	1	1					1	1
EAST SOUTH CENTRAL											
Kentucky	53	22	39								
Tennessee	36	33	33				1		1		1
Alabama	61	25	37							5	1
Mississippi [3]	6			3	2				2		2
WEST SOUTH CENTRAL											
Arkansas	45	6	14	2		1			3		
Louisiana	9	30	5	10					4	2	
Oklahoma	20	14	17						1		7
Texas	763	106	270	11	214	17				13	10
MOUNTAIN											
Montana	5	4	5								1
Idaho	9	11	9					2			1
Wyoming	21	2	3					1			
Colorado	42	35	34								
New Mexico	28	9	9								
Arizona	31	9	20			15					
Utah [3]	5	36	44								8
Nevada			3								
PACIFIC											
Washington	26	48	40	1							
Oregon	22	18	19								
California	351	135	283	5	1		1				8
Total	3,609	2,073	2,040	46	230	117	7	3	15	26	117
Same week, 1946	2,073			20	322	129	11	8	14	45	112
Median, 1942-46	2,646			24	285	90	11	8	9	45	[6] 92
18 weeks: 1947	48,000			828	5,303	3,619	121	21	570	690	1,868
1946	33,035			669	5,261	1,868	153	29	329	827	1,463
Median, 1942-46	44,726			528	3,959	1,220	153	29	294	817	[6] 1,501

[3] Period ended earlier than Saturday.
[6] 2-year average, 1945-46.
Anthrax: Pennsylvania 1 case.

Leprosy: California 1 case.
Psittacosis (week ended April 26): California 1 case.
Rat bite fever: Oklahoma 1 case.

WEEKLY REPORTS FROM CITIES[1]

City reports for week ended Apr. 26, 1947

This table lists the reports from 90 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0	------	0	52	0	4	0	2	0	0	13
New Hampshire:												
Concord	0	0	------	0	------	0	2	0	0	0	0	------
Vermont:												
Barre	0	0	------	0	3	0	2	0	0	0	0	1
Massachusetts:												
Boston	4	0	------	0	65	3	12	0	21	0	1	12
Fall River	0	0	------	0	------	1	1	0	2	0	0	1
Springfield	0	0	------	0	23	0	0	0	6	0	0	2
Worcester	0	0	------	0	9	0	4	0	4	0	1	6
Rhode Island												
Providence	0	0	1	1	226	0	2	0	6	0	0	10
Connecticut:												
Bridgeport	0	0	------	0	14	0	4	0	2	0	0	1
Hartford	1	0	------	0	95	0	2	0	2	0	0	------
New Haven	0	0	------	0	97	0	0	0	3	0	0	8
MIDDLE ATLANTIC												
New York:												
Buffalo	1	0	------	3	1	2	12	0	3	0	0	1
New York	14	1	5	0	321	5	66	1	122	0	1	64
Rochester	0	0	------	0	4	2	2	0	15	0	0	1
Syracuse	0	0	------	0	1	0	2	0	8	0	0	15
New Jersey:												
Camden	8	0	------	0	1	0	2	0	2	0	0	------
Newark	0	0	2	0	27	0	8	0	14	0	0	22
Trenton	0	0	------	0	4	0	2	0	3	0	0	7
Pennsylvania:												
Philadelphia	2	0	5	4	17	0	28	0	48	0	0	44
Pittsburgh	4	0	1	1	11	0	12	0	11	0	0	10
Reading	0	0	------	0	3	0	1	0	3	0	0	------
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	0	0	1	1	2	1	3	0	7	0	0	5
Cleveland	1	0	4	0	185	1	11	0	30	0	0	46
Columbus	0	0	3	3	33	0	0	0	9	0	1	20
Indiana:												
Fort Wayne	0	0	------	0	25	0	2	0	2	0	0	2
Indianapolis	1	0	1	0	1	0	4	0	10	0	0	51
South Bend	0	0	------	0	34	0	0	0	2	0	0	------
Terre Haute	0	0	------	0	------	0	0	0	6	0	0	------
Illinois:												
Chicago	0	1	3	0	28	5	24	0	34	0	0	32
Springfield	0	0	------	0	19	0	3	0	0	0	0	------
Michigan:												
Detroit	1	0	1	1	3	0	9	0	40	0	0	97
Flint	0	0	------	0	------	0	6	0	3	0	0	------
Grand Rapids	0	0	------	1	1	1	0	0	3	0	0	9
Wisconsin:												
Kenosha	0	0	------	0	------	0	0	0	1	0	0	10
Milwaukee	0	0	------	0	15	0	6	0	4	0	0	33
Racine	0	0	------	0	------	0	0	0	12	0	0	11
Superior	0	0	------	0	------	0	0	0	0	0	0	------
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0	------	0	------	0	2	0	1	0	0	7
Minneapolis	0	0	------	0	10	2	6	0	2	0	0	2
St. Paul	0	0	------	0	230	0	3	0	9	0	0	5
Missouri:												
Kansas City	0	0	------	1	2	0	6	1	7	0	0	------
St. Joseph	0	0	------	0	------	0	0	0	0	0	0	2
St. Louis	2	0	2	0	------	1	5	0	8	0	2	6

[1] In some instances the figures include nonresident cases.

City reports for week ended Apr. 26, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
North Dakota:												
Fargo	0	0		0	4	0	3	0	2	0	0	
Nebraska:												
Omaha	1	0		0	3	0	2	1	1	0	0	2
Kansas:												
Topeka	0	0		0		0	1	0	1	0	0	2
Wichita	0	0		0	1	0	5	0	0	0	0	3
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0		0		0	3	0	2	0	0	4
Maryland:												
Baltimore	7	0	3	1	7	1	8	0	14	0	0	62
Cumberland	0	0		0		0	2	0	3	0	0	
Frederick	0	0		0		0	0	0	0	0	0	
District of Columbia:												
Washington	0	0		0	32	3	12	0	9	0	0	11
Virginia:												
Lynchburg	0	0		0		0	1	0	2	0	0	1
Richmond	0	0	1	1	65	1	2	0	1	0	0	
Roanoke	0	0		0	22	0	0	0	1	0	0	
West Virginia:												
Charleston	0	0		0		0	0	0	0	0	0	
Wheeling	0	0		0		0	3	0	0	0	0	1
North Carolina:												
Raleigh	0	0		0	7	0	3	0	0	0	0	16
Wilmington	0	0		0	8	0	0	0	1	0	0	
Winston-Salem	1	0		0	21	0	3	0	3	0	0	2
South Carolina:												
Charleston	0	0	10	0	23	0	1	0	1	0	0	
Georgia:												
Atlanta	0	0	2	2	17	0	3	0	2	0	0	3
Brunswick	0	0		0		0	1	0	0	0	0	
Savannah	0	0	2	2	7	0	2	0	1	0	0	
Florida:												
Tampa	0	0		0	4	0	3	0	0	0	0	
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	0	0	4	2	6	0	8	0	2	0	0	
Nashville	0	0		0	1	1	3	0	2	0	0	7
Alabama:												
Birmingham	0	0	9	0	32	1	3	0	0	0	0	
Mobile	0	0	2	0	9	0	2	0	0	0	0	
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	1	0	2	0	9	0	0	0	0	9
Louisiana:												
New Orleans	2	0	8	0	70	1	8	1	3	0	3	5
Shreveport	0	0		0		0	7	0	0	0	0	
Oklahoma:												
Oklahoma City	0	0	4	0		0	1	0	1	0	0	1
Texas:												
Dallas	1	0		0	118	0	4	0	5	0	1	7
Galveston	0	0		0		0	1	0	0	0	0	
Houston	4	0	8	0	5	0	9	0	5	0	1	1
San Antonio	0	2	1	0	4	0	8	0	0	0	0	1
MOUNTAIN												
Montana:												
Billings	0	0		0		0	2	0	0	0	0	
Great Falls	2	0		0	15	0	0	0	0	0	0	
Helena	0	0		0	2	0	0	0	0	0	0	2
Missoula	0	0	57	0	20	0	1	0	0	0	0	
Colorado:												
Denver	3	0	2	0	26	0	6	0	20	0	0	4
Pueblo	1	0		0		0	0	0	1	0	0	
Utah:												
Salt Lake City	0	0		0	4	0	1	0	3	0	1	

City reports for week ended Apr. 26, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle	1	0	-----	0	8	0	8	0	7	0	0	5
Spokane	0	0	1	0	15	0	1	0	1	0	0	4
Tacoma	0	0	------	0	-------	0	0	0	2	0	0	3
California:												
Los Angeles	5	0	4	1	12	1	4	5	22	0	1	50
Sacramento	0	0	------	0	3	0	0	0	1	0	0	4
San Francisco	1	0	1	0	7	0	4	2	2	0	2	3
Total	68	4	149	25	2,192	33	401	11	588	0	15	769
Corresponding week, 1946*	86	------	59	20	12,004	------	340	------	1,083	2	15	492
Average 1942-46*	65	------	63	[2] 19	[3] 6,574	-----	[2] 351	------	1,583	1	13	768

[2] 3-year average, 1944-46.
[3] 5-year median, 1942-46.
*Exclusive of Oklahoma City.

Anthrax.—Cases: Philadelphia 1.
Dysentery, amebic.—Cases: New York 1; Detroit 2; St. Louis 1; New Orleans 1; Los Angeles 3.
Dysentery, bacillary.—Cases: New York 4; Cleveland 1; St. Louis 1; Memphis 1; Los Angeles 1.
Dysentery, unspecified.—Cases: Fargo 1 (newborn); San Antonio 6.
Leprosy.—Cases: Topeka 1.
Tularemia.—Cases: New Orleans 2.
Typhus fever, endemic.—Cases: New York 1; Savannah 1; Tampa 2; Mobile 1; New Orleans 1.

Rates (annual basis) per 100,000 population, by geographic groups, for the 90 cities in the preceding table (latest available estimated population, 34,605,800)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England	13.1	0.0	2.6	2.6	1,527	10.5	86.3	0.0	125	0.0	5.2	141
Middle Atlantic	13.4	0.5	6.0	3.7	181	4.2	60.2	0.5	106	0.0	0.5	76
East North Central	1.8	0.6	7.9	3.6	241	4.9	41.3	0.0	99	0.0	0.6	192
West North Central	6.0	0.0	4.0	2.0	497	6.0	65.7	4.0	62	0.0	4.0	58
South Atlantic	13.1	0.0	20.4	9.8	348	8.2	76.8	0.0	65	0.0	0.0	163
East South Central	0.0	0.0	88.5	11.8	283	11.8	94.4	0.0	21	0.0	0.0	41
West South Central	17.8	5.1	55.9	0.0	505	2.5	119.4	2.5	36	0.0	12.7	61
Mountain	49.6	0.0	487.3	0.0	553	0.0	82.6	0.0	198	0.0	8.3	50
Pacific	11.1	0.0	9.5	1.6	71	1.6	26.9	11.1	55	0.0	4.7	109
Total	10.3	0.6	22.5	3.8	331	5.0	60.6	1.7	89	0.0	2.3	116

PLAGUE INFECTION IN YAKIMA COUNTY, WASH.

Under date of April 29, plague infection was reported proved, on April 28, in a pool of 18 fleas from 19 pocket mice, *Perognathus* sp., and 89 fleas from white-footed mice, *Peromyscus* sp., collected April 11 at a location 6 miles east of Antiaircraft Range Headquarters, Yakima County, Wash.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended April 12, 1947.—During the week ended April 12, 1947, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox	2	17	--------	158	186	15	21	64	94	557
Diphtheria	2	--------	1	13	3	2	--------	--------	--------	21
German measles	--------	--------	--------	32	45	5	7	3	2	94
Influenza	8	15	--------	--------	20	6	--------	--------	13	62
Measles	2	25	--------	57	96	267	47	80	487	1,061
Meningitis, meningococcus	--------	--------	1	2	--------	1	--------	--------	--------	4
Mumps	--------	6	--------	32	477	46	99	15	185	860
Scarlet fever	--------	5	9	56	84	3	--------	5	11	173
Tuberculosis (all forms)	--------	2	5	104	32	26	9	18	74	270
Typhoid and paratyphoid fever	--------	--------	3	11	2	--------	--------	--------	--------	16
Undulant fever	--------	--------	--------	2	1	--------	--------	--------	--------	3
Venereal diseases:										
Gonorrhea	2	6	18	165	(1)	41	20	39	75	366
Syphilis	1	9	6	55	(1)	14	8	8	32	133
Other forms	--------	--------	--------	--------	(1)	--------	--------	--------	2	2
Whooping cough	--------	1	1	34	53	11	--------	--------	39	139

[1] Figures for Ontario for the above period not received.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

India—Calcutta.—For the week ended April 12, 1947, 433 cases of cholera with 125 deaths were reported in Calcutta, India.

Siam (Thailand)—Bangkok.—For the week ended April 19, 1947, 61 cases of cholera were reported in Bangkok, Siam (Thailand).

Plague

Egypt—Alexandria.—On April 29, 1947, 1 case of plague was reported in Alexandria, Egypt. The last previously reported case of plague in Alexandria occurred on September 9, 1946.

Peru—Piura Department—Huancabamba Province.—During the month of March 1947, 10 cases of plague were reported in Huancabamba Province, Piura Department, Peru.

Turkey—Urfa Province—Akcakale.—For the week ended April 19, 1947, 2 cases of plague were reported in Akcakale, Urfa Province, Turkey.

Smallpox

Belgian Congo.—For the week ended April 5, 1947, 47 cases of smallpox with 1 death were reported in Belgian Congo.

Ethiopia.—Smallpox has been reported in Ethiopia as follows: Weeks ended—March 1, 1947, 12 cases; March 8, 1947, 2 cases; March 22, 1947, 3 cases.

India—Calcutta.—For the week ended April 12, 1947, 157 cases of smallpox with 124 deaths were reported in Calcutta, India.

Niger Territory.—For the period March 21–31, 1947, 240 cases of smallpox with 52 deaths were reported in Niger Territory.

Typhus Fever

Eritrea.—For the week ended April 5, 1947, 42 cases of typhus fever with 1 death were reported in Eritrea.

Ethiopia.—Typhus fever has been reported in Ethiopia as follows: Weeks ended—March 1, 1947, 4 cases; March 8, 1947, 7 cases; March 22, 1947, 20 cases.

Guatemala.—During the month of February 1947, 63 cases of typhus fever. (including 4 cases reported in Guatemala city) with 10 deaths were reported in Guatemala.

Libya—Tripolitania.—For the month of February 1947, 18 cases of typhus fever were reported in Tripolitania, Libya.

Peru.—For the month of February 1947, 74 cases of typhus fever were reported in Peru.

Poland.—For the week ended March 8, 1947, 19 cases of typhus fever were reported in Poland.

Rumania.—Typhus fever has been reported in Rumania as follows: February 1–28, 1947, 1,427 cases; March 1–31, 1947, 3,378 cases. In Bucharest, Rumania, 253 cases of typhus fever were reported for the week ended March 29, 1947, and 286 cases of typhus fever with 19 deaths were reported for the week ended April 5, 1947.

* * *

SMALLPOX IN NEW YORK CITY

During the week ended May 3, 2 cases of smallpox were reported in New York City, the first reported cases since April 9. The total since March 1 is 10 cases with 2 deaths in the city and 4 cases in an adjacent area, the first case of which was a New York City contact. Seven other cases were reported in the United States during the week, as follows: Wisconsin 3, Kentucky 2, New Mexico and Indiana 1 each.

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Public Health Reports

VOLUME 62 MAY 30, 1947 NUMBER 22

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INCIDENCE OF DISEASE

Public Health Reports

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RICKETTSIALPOX—A NEWLY RECOGNIZED RICKETTSIAL DISEASE

V. RECOVERY OF *RICKETTSIA AKARI* FROM A HOUSE MOUSE (*MUS MUSCULUS*)[1]

By ROBERT J. HUEBNER, *Senior Assistant Surgeon,* WILLIAM L. JELLISON, *Parasitologist,* CHARLES ARMSTRONG, *Medical Director, United States Public Health Service*

Rickettsia akari, the causative agent of rickettsialpox, was isolated from the blood of persons ill with this disease (*1*) and from rodent mites *Allodermanyssus sanguineus* Hirst inhabiting the domicile of ill persons (*2*). This paper describes the isolation of *R. akari* from a house mouse (*Mus musculus*) trapped on the same premises—a housing development in the city of New York where more than 100 cases of rickettsialpox have occurred (*3*), (*4*), (*5*), (*6*).

Approximately 60 house mice were trapped in the basements of this housing development where rodent harborage existed in store rooms and in incinerator ashpits. Engorged mites were occasionally found attached to the mice, the usual site of attachment being the rump. Mites were frequently found inside the box traps after the captured mice were removed.

Early attempts to isolate the etiological agent of rickettisalpox from these mice were complicated by the presence of choriomeningitis among them. Twelve successive suspensions of mouse tissue, representing 16 house mice, inoculated intracerebrally into laboratory mice (Swiss strain) and intraperitoneally into guinea pigs resulted in the production of a highly lethal disease in both species which was identified immunologically as choriomeningitis.

[1] From the division of Infectious Diseases, National Institute of Health.

ISOLATION OF THE HOUSE MOUSE STRAIN

Laboratory mice (Swiss strain) were immunized by subcutaneous inoculation with a sublethal dose of choriomeningitis virus. Approximately 1 month later, on October 7, 1946, saline suspensions of liver and spleen from three house mice freshly trapped at the rickettsialpox focus were inoculated respectively into three groups of the choriomeningitis-immune laboratory mice.

On October 16, one group of inoculated mice showed signs of illness; inactivity, ruffled fur, and rapid breathing. On October 17, one mouse died. Two others were sacrificed and tissues transferred to mice and guinea pigs. Both sub-passages produced the external signs and gross pathological changes typical of rickettsialpox and *R. akari* was recovered from the tissues of guinea pigs and mice.

Employing guinea pigs, reciprocal cross immunity was demonstrated between the house mouse strain and the human and mite strains. Growth of the house mouse strain in the yolk sacs of fertile eggs was initiated with tunica washings from an infected guinea pig. On successive passages the growth was abundant, and morphologically the organisms could not be distinguished from those of the human strains of *R. akari*.

Antigens prepared by ether extraction of infected yolk sacs (*7*) for use in the complement-fixation test (*8*) were of high potency and were serologically indistinguishable from antigens prepared from human strains (table 1). Titrations of pooled serum collected from guinea pigs recovered from infection with the house mouse strain are shown in table 2.

TABLE 1.—*Complement fixation by house mouse and M. K. antigens in the presence of specified guinea-pig serums*

Guinea-pig serums used in 1:16 dilution	House mouse antigen [1] titer	M. K. antigen [1] titer	Guinea-pig serums used in 1:16 dilution	House mouse antigen [1] titer	M. K. antigen [1] titer
Normal	Negative	Negative	M. K.	1:32	1:128
Endemic typhus	Negative	Negative	Mite No. 1	1:128	1:128
Q fever	Negative	Negative	House mouse	1:64	1:128
Rocky Mountain spotted fever.	1:64	1:64			

[1] Made from 10-percent yolk-sac suspensions.

A high incidence of immunity to rickettsialpox in the mice trapped at the rickettsialpox focus was indicated by their resistance to challenge with the 10^{-1} dilution of a viable yolk-sac suspension lethal (LD_{50}) for white mice (Swiss strain) in dilutions as high as 10^{-5}. House mice (*Mus musculus*) trapped in northern Virginia were found to be susceptible to experimental rickettsialpox on a scale comparable to the susceptibility of the Swiss strain (table 3).

Evidence of immunity to rickettsialpox was also demonstrated by the complement-fixation test in serums of mice collected at a New York City focus of infection while no antibodies were found in the serums of normal laboratory mice or of house mice trapped in northern Virginia (table 4).

TABLE 2.—*Titrations in the complement-fixation test of pooled serums taken from guinea pigs recovered from infection with house mouse and M. K. strains of rickettsialpox*

Antigens used in constant dilutions [1]	Titer of house mouse strain serum pool	Titer of M. K. strain serum pool	Antigens used in constant dilutions [1]	Titer of house mouse strain serum pool	Titer of M. K. strain serum pool
M. K. strain	1:32	1:128	Rocky Mt. spotted fever (B. R. strain)	0	1:16
Mite strain	1:16	1:64	Q fever (Italian strain)	0	0
House mouse strain	1:32	1:64			

[1] 2 units as determined in titration with homologous antiserums.

TABLE 3.—*Comparative number of survivors among mice from specified sources after intraperitoneal challenge with a yolk-sac suspension of R.* akari (*M. K. strain*)

Source of mice	Number of survivors in relation to number of mice inoculated: Concentration of challenge materials [1] 10⁻¹	10⁻²	10⁻³	Totals
Wild house mice trapped at a focus of infection in New York City	5:5	3:5	5:5	13:15
Wild house mice trapped in Virginia	0:4	2:5	2:5	4:15
Laboratory mice (Swiss strain)	0:5	1:5	2:5	3:15

[1] LD_{50} titer 10^{-3} (skim milk used as diluent).

TABLE 4.—*Complement fixation results with serums of house mice trapped at a focus of infection* [1] *and elsewhere and of white mice*

Source of mouse serums	Number of mouse serums examined in complement fixation tests [2]	Number positive for rickettsialpox	Range of titers
House mice [1] trapped at focus of infection	7	4	1:16 to 1:32.
House mice trapped in Virginia	6	0 (negative at 1:8)	
White mice (Swiss strain)	10	0 (negative at 1:4)	
White mice experimentally infected with rickettsialpox [3]	2	2	Both greater than 1:32.

[1] Mice were bled approximately 2 months after capture
[2] Bengtson technique used.
[3] Bled 30 days after inoculation.

DISCUSSION

Infestations of house mice with mites (*Allodermanyssus sanguineus*) Hirst were described in a previous communication, and the ability of *A. sanguineus* to transmit rickettsialpox to experimental animals was demonstrated (*2*). The data presented in this paper show that the house mouse (*Mus musculus*) may harbor the infection in nature.

Immunity of mice from infected homes was also demonstrated by direct challenge and by the complement-fixation test. These findings suggest methods for the investigation of suspected foci of rodent infection.

SUMMARY

Rickettsia akari, the causative agent of rickettsialpox was recovered from the tissues of a naturally infected house mouse (*Mus musculus*) trapped at the site of an outbreak of the disease.

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PLAGUE—FIELD SURVEYS IN WESTERN UNITED STATES DURING TEN YEARS (1936–1945)[1]

By N. E. Wayson, *Medical Director, United States Public Health Service*

The investigations of the circumstances surrounding the death of two people from bubonic plague in July 1908, in a semirural area bordering San Francisco Bay, revealed an enzootic of plague among

[1] The surveys have been successively directed and the results recorded by H. E. Hasseltine, Medical Director; C. R. Eskey, Medical Director; L. D. Byington, Senior Surgeon; and N. E. Wayson, Medical Director.

the California ground squirrels (*Citellus beecheyi beecheyi*) of Contra Costa County, California. This discovery stimulated explorations to determine the extent to which the infection had spread, and during the succeeding 10 years, the United States Public Health Service made examinations of more than 500,000 ground squirrels collected from large areas of 31 counties in California and 5 bordering counties of Nevada and Oregon. The squirrels, or rats, of 11 counties were found to be infected. Similar surveys of very much less scope and intensity were continued until 1927 by the United States Public Health Service, and subsequently by the California State Department of Health. In 1934, two sharp outbreaks of plague occurred among ground squirrels in Kern County, and among ground squirrels and wood rats (*Neotoma cinerea*) of Modoc County, both of California. These two counties are approximately 200 miles north and 200 miles south, respectively, of the Sacramento River, which had formerly been considered a barrier to the northern extension of the infection. Modoc County is at the northern boundary of California and borders on Lake County of Oregon. These two outbreaks were followed by an expansion of the investigations in California by the board of health, and during the past 10 years, infection has been found in ground squirrels and in a few rodents of other genera from 17 other counties. Over the entire period of 37 years, infected animals or parasites have been collected in 33 of the 58 counties of the State.

Also in 1934, a sheepherder died of bubonic plague in Lake County, Oregon, which adjoins Modoc County, California. In the spring of 1935, the United States Public Health Service equipped a field party with a mobile laboratory and made collections and examinations of animals of Lake County, of a few adjoining counties in Oregon, of some adjacent counties in Nevada, and of 10 counties in California. Infection was found in ground squirrels (*Citellus columbianus* and *Citellus beldingi oregonus*) in three counties of Oregon. During the same year, infection was discovered also in three Richardson ground squirrels which were found dead, or sick, in Montana and were submitted for examination by collaborating officials. These discoveries suggested the necessity of extending the surveys to other States. From two to nine field parties of the Public Health Service have continued the investigations annually, with collaboration by the health departments of Washington, Oregon, Idaho, Montana, and Utah.

FLEAS AS INDEX OF PLAGUE

Studies in 1915 in this laboratory demonstrated that plague could be discovered in an area in which there was no record of recent infection

among the rodents. Fleas collected from burrows or animals in such an area, shipped for a short distance to the laboratory, and anaesthetized to facilitate handling, remained alive for periods of 14 to 21 days under a quarantine, and transmitted the disease to animals by biting.

These facts were put into practical use with the beginning of the field operations in 1936, and have been shown to be so valuable an adjunct to the discovery of plague in rodents that they have been continued throughout the past 10 years.

EXTENT OF SURVEYS

During this period (1936-45), surveys varying in extent from as little as 10 to as much as 1,000 square miles have been made in each of 487 counties of a total of 644 counties between the Pacific Coast and the 100th meridian, and the Canadian and Mexican boundaries, in 17 western States. This area constitutes approximately 40 percent of continental United States. In general, the surveys have been limited to locations which could be reached by roads, and to the surroundings of communities which were served by railroad or other nearby shipping facilities. The areas from which collections were made were but a small portion of the total areas surveyed.

The surveys were made by units of two men of practical experience in hunting and trapping, who were trained in the dissection of animals, the recognition of the pathology of plague, the identification and classification of animals and their habits and range, the collection of animal parasites, and in the preparation and shipment of specimens for final tests. The unit had a mobile laboratory of a panel truck which was equipped with all the accoutrements and facilities necessary to make and examine collections of animals and to prepare and ship specimens of tissues or fleas for bacteriological tests throughout a season of from 6 to 8 months. All the collected parasites and the selected specimens of tissue were subjected to differential bacteriological and pathological tests at the central laboratory at San Francisco, Calif. More than 595,097 rodents, 1,186,777 fleas, and a small number of other animals and parasites have been collected and examined; and 461 specimens of tissues or of fleas have been found infected with plague. These specimens were obtained from 70 counties, which are scattered throughout the area as far eastward as western North Dakota, Kansas, and Oklahoma. and are exclusive of the State of California. The State Health Department of California has conducted similar operations throughout the 10 years, though with differences in procedures and accounting. It reports plague in the following specimens: Tissues of 828 field rodents, 9 Norway

rats, 80 pools of the tissues of several rodents, and 492 pools of rodent fleas, collected from 33 of the 58 counties of California between 1927 and 1945.

VARIETY OF ANIMALS INFECTED

The animals collected and examined by the Public Health Service were of 45 genera of 5 orders—Marsupiala, Insectivora, Carnivora, Rodentia, and Lagomorpha—and a few specimens of bats (Chiroptera) hawks and owls (Raptores). Twenty-six species of the genus and subgenera of *Citellus* were included. Plague was found in tissues and in fleas of nine species of ground squirrels (*Citellus armatus, beecheyi beecheyi, beldingi, columbianus, richardsonii, townsendii, tridecemlineatus, variegatus, washingtoni*), and in fleas infesting three other species (*Citellus beecheyi douglasii,*[2] *idahoensis, lateralis*). Specimens of tissue of eight other genera, and of their infesting fleas, were also found to be infected: prairie dogs (*Cynomys*), kangaroo rats (*Dipodomys*), marmots (*Marmota*), meadow mice (*Microtus*), wood or pack rats (*Neotoma*), grasshopper mice (*Onychomys*), rats (*Rattus*), and cottontail rabbits (*Sylvilagus*). Infected fleas were taken also from chipmunks (*Eutamia*), weasels (*Mustela*), deer mice (*Peromyscus*), harvest mice (*Reithrodontomys*), cotton rats (*Sigmodon*) and badgers (*Taxidea*) (table 1). The infected specimens consisted of 153 tissues or pools [3] of tissues, and 308 pools of fleas.

Aside from those of the genus *Sylvilagus*, all the infected animals were of the rodentia, though it may be remarked that relatively few individuals of other orders were captured.

Infected specimens of tissue only were found in 8 counties, infected fleas only in 37, and both infected tissues and fleas in 25. Thus, there were 33 counties in which infected tissues were found, and 37 in which only infected fleas were found.

Previous to 1935, attention was restricted to ground squirrels almost exclusively, but after this date and more particularly during the past 5 years, emphasis has been put on the collection of other rodents. The relative incidence of plague found among the latter has been 12 specimens of tissue and 62 specimens of fleas among 188,815 animals, exclusive of prairie dogs (*Cynomys*) and rats (*Rattus*). Prairie dogs are excepted because of their habits of colonization and hibernation, which are similar to those of ground squirrels. Rats are excepted because the larger number of them were taken in cities or towns and

[2] Infection has been found in *C. beecheyi douglasii* in California.

[3] A pool of tissue is a portion of the tissues of each of several animals of the same species, collected at one hunting area on the same day. A pool of fleas is the total obtained from all the animals of the same species collected at one hunting area in 1 to 3 days. A hunting area is a specific district in a city, or an area of 5 to 25 square miles in the country.

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TABLE 1.—*Specimens of mammals collected during plague surveys, 1936–1945 by order and genera (Anthony); and subgenera and species of* Citellus *(Howell)*

[Those in which plague was found are marked with P and those from which only infected fleas were collected are marked PF.]

Order	Genus	
Carnivora	*Canis*	
	Felis	
	Mephitis	
	Mustela	PF
	Procyon	
	Spilogale	
	Taxidea	PF
	Vulpes	
Insectivora	*Blarina*	
	Cryptotis	
	Neurotrichus	
	Scapanus	
	Sorex	
Lagomorpha	*Brachylagus*	
	Lepus	
	Ochotona	
	Sylvilagus	P
Marsupialia	*Didelphis*	

Order	Genus		Genus	
Rodentia	*Aplodontia*		*Neotoma*	P
	Castor		*Ondatra*	
	Citellus	P	*Onychomys*	P
	Cynomys	P	*Perognathus*	
	Dipodomys	P	*Peromyscus*	PF
	Erethizon		*Phenacomys*	
	Eutamia	PF	*Rattus*	P
	Evotomys		*Reithrodontomys*	PF
	Geomys		*Sciurus*	
	Glaucomys		*Sigmodon*	PF
	Marmota	P	*Synaptomys*	
	Microtus	P	*Thomomys*	
	Mus		*Zapus*	

Citellus—Genus

Subgenus	Species	
Citellus	*armatus*	P
	beldingi	P
	columbianus	P
	idahoensis	PF
	richardsonii	P
	townsendii	P
	washingtoni	P
Ammospermophilus	*harrisii*	
	interpres	
	leucurus	
Callospermophilus	*lateralis*	PF
	saturatus	
Ictidomys	*mexicanus*	
	spilosoma	
	tridecemlineatus	P
Otospermophilus	*beecheyi*	P
	variegatus	P
Poliocitellus	*franklinii*	
Xerospermophilus	*mohavensis*	
	tereticaudus	

in their immediate environs. Eleven tissue specimens and thirty-eight flea specimens were found infected among a collection of 85,414 prairie dogs. One infected Norway rat was found in San Francisco, California, and 37 specimens of tissues and 64 pools of fleas were infected among those of rats trapped in Tacoma, Washington.[4]

FLEA VECTORS AND "FLEA INDEX"

The collection of fleas included 1 or more species of 53 genera, but neither the classification and distribution of all the species, nor their role in the transmission of the disease has been determined. Under laboratory conditions, 36 species have become infected, and 19 of them have proven to be capable vectors. Other investigators have reported infection in seven additional species which are common to the area surveyed, and transmission of the disease by five of these (table 2).

The number of fleas recovered per animal, the flea index, varied with location, season, and species of animal. Among rodents which have been found infected, the indices from the over-all collections are: *Dipodomys*, collection 38,277, index 0.2; *Microtus*, collection 16,493, index 0.87; *Onychomys*, collection 16,876, index 1.0; *Cynomys*, collection 85,414, index 3.0; *C. Variegatus*, collection 2,411, index 11.2;

[4] Plague was also found during this period in rats or their fleas in communities about San Francisco Bay, by the California State Health Department.

TABLE 2.—*Specimens of fleas collected, by genera, and species proven to be vectors*

Actenophthalmus	*Ctenophyllus*	*Megabothris*	*Phalacropsylla*
Amphalius	*Dactylopsylla*	*Megarthroglossus*	*Pleochaetis*
Anomiopsyllus	*Dasypsyllus*	*Meringis*	*Pulex*
Atyphloceras	*Diamanus*	*Micropsylla*	*Rectofrontia*
Callistopsyllus	*Dolochopsyllus*	*Monopsyllus*	*Rhinolopsyllus*
Carteretta	*Doratopsylla*	*Myodopsyllus*	*Rhopalopsyllus*
Catallagia	*Echidnophaga*	*Nearctopsylla*	*Stenistomera*
Cediopsylla	*Epitedia*	*Nosopsyllus*	*Stenoponia*
Ceratophyllus	*Foxella*	*Odontopsyllus*	*Thrassis*
Conorhinopsylla	*Geusibia*	*Opisocrostis*	*Trichopsylloides*
Coropsylla	*Hoplopsyllus*	*Opisodasys*	*Xenopsylla*
Corypsylloides	*Hystrichopsylla*	*Orchopeas*	
Ctenocephalides	*Leptopsylla*	*Oropsylla*	
Ctenopthalmus	*Malareus*	*Peromyscopsylla*	

Flea vectors

Atyphloceras multidentatus (5)[1]	*Monopsyllus eumolpi* (2)	*Thrassis acamantis* (2)
Ctenocephalides canis (1)	*Nosopsyllus fasciatus* (2)	*Thrassis arizonensis* (2)
Ctenocephalides felis (1)	*Orchopeas sexdentatus* (2)	*Thrassis bacchi* (4)
Diamanus montanus (2)	*Opisocrostis bruneri* (4)	*Thrassis fatus* (5)
Hoplopsyllus anomalus (2)	*Opisocrostis hirsutus* (2)	*Thrassis francisi* (2)
Hystrichopsylla dippiei (5)	*Opisocrostis labis* (2)	*Thrassis howelli* (2)
Leptopsylla segnis (1)	*Opisocrostis tuberculatus* (2)	*Thrassis pandorae* (2)
Malareus telchinum (3)	*Oropsylla rupestris* (2)	*Xenopsylla cheopis* (2)
	Pulex irritans (1)	

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Marmota, collection 4,465, index 13.5. Indices for other ground squirrels are of the order of 3.0, except those of *C. beecheyi beecheyi* and *C. beecheyii douglasii*, which are of the order of *C. variegatus* (11 to 14). There is no evidence of a correlation between the indices of sick and normal animals either from the same area or from similar areas. Nor is the seasonal variation found during some years consistent, either annually or in different locations during the same year. The indices have been determined by collecting and examining the larger rodents promptly after they had been killed, whereas the smaller rodents were examined after they had lain in a dead-fall trap for 12 hours or longer. Numerous experiences indicate that animals trapped alive and collected some hours later frequently have a lower index than those killed quickly. This may be due in part to the struggles of the live animal to release itself. However, 50 to 60 percent of hungry fleas placed on a contented live animal under controlled conditions deserted it within 16 hours. On the other hand, animals collected 12 hours or longer after having been killed in a deadfall trap have occasionally had from 200 to 900 fleas on them. The lack of correlation between the flea index and the number of fleas to which the animal is exposed

is exemplified by the observation of an index of 3.0 among 500 trapped animals, whereas each of 13 of their nearby nests contained over 1,000 fleas. It may be noted also that an index of less than one does not eliminate the probability of dissemination of infection. One flea infected with plague has transmitted the infection to each of several animals when afforded the opportunity. This condition may occur in the nests of young animals, and amongst the dense population in the burrows of colonizing animals.

The facility with which different species of fleas transmit the infection under experimental conditions varies greatly. One factor which may influence the variation is the length of time which is required, apparently, for the development of the condition within the flea which effects or aids in transmission. This may occur within 5 to 10 days in *Xenopsylla cheopis*, the Indian rat flea, and under like conditions has occurred usually only after 15 days in *Nosopsyllus fasciatus* (the rat flea common to the Pacific Coast States). Individuals of other species have failed in transmission during repeated opportunities for as long as 3 months after having fed on an infected animal, but have then been successful. There are doubtless other factors concerned. Thus, 1,168 trials to infect an animal through feedings with 148 specimens of *Malareus telchinum*, a flea common to the meadow mouse, were unsuccessful under conditions in which each individual flea was under constant control, whereas transmissions by this species occurred when 50 to 100 of the fleas were placed on their natural host in a noninfected environment but without further controls.

Various species of fleas exhibit some degree of specificity in the choice of their hosts, and it would seem that this flea-host selectivity might at least retard if not restrict the dissemination of infection from an animal of one genus to that of another. However, hungry fleas will feed avidly on hosts of each of several genera, and species of fleas which are very efficient vectors frequently infest a host whose specific flea is a poor vector. Fleas of two or three genera are often found on an animal. Dissemination of plague vectors to animals of different genera may be aided also by the habits of a host such as the grasshopper mouse (*Onychomys*), which is a meddlesome rodent that visits burrows and nests of animals of other genera. This mouse is often infested with fleas which are specific to each of several other rodents, and collects and perhaps spreads these several varieties of fleas during its visits.

SEASONS AND GEOGRAPHY OF PLAGUE

The collections of field animals have been made for the most part during the seasons in which the weather permits of travel and of the

more profitable hunting and trapping of the various rodents, including those which hibernate during periods of cold, snow, and winter rains. This season extends from about the 1st of March through September. Specimens with plague have been found during each month of the season The greatest number has been collected in July, about half as many in each of the months from April to August, and about one-quarter as many in each of March and September. Infected meadow mice (*Microtus*) and infected fleas of deer mice (*Peromyscus*), as well as infected specimens of tissue and fleas of rats (*Rattus*) have been collected during December on the Pacific slope in Washington.[5]

The period during which plague will persist in rodents of a given area has not been determined by systematic investigations under properly controlled circumstances. Plague has been found in specimens collected from one locality during each of four successive animal seasons, and, on the other hand, plague has been found in one season and has not been found during four successive seasons, although adequate collections have been made from the same farms and surroundings on which it had been discovered previously. It has not been uncommon to find plague in the same locality during two successive seasons. During the past 5 years, the surveys have been directed with the purpose of learning whether the infection is extending into territory in which it has not previously extended, insofar as can be determined. Collections have been made in some of the latter areas in each of three or more years without finding any infection, but after these repeated negative results it has been found in later years.

Neither the persistence of a focus of infection from year to year, nor its primary discovery has shown any correlation with the total population of the rodents or the flea index, or with the number of animals examined above a minimum sample of one hundred.

Infected rodents and fleas have been found in areas at sea level and in those intervening areas up to an altitude as high as 9,000 feet, between the parallel of latitude 30° N. to the Canadian boundary. (Canadian authorities have reported the presence of infected rodents as far north as latitude 52° N.) The terrains of these collections have been deserts, grasslands, mountain meadows, rock ledges, fringes of cultivated areas which may or may not be irrigated, banks of streams, and rights-of-way along railroads and highways. The interior of forests and of large cultivated acreages without barren spots have not yielded positive results.

[5] Infected ground squirrels and fleas have been collected by the California State Health Department on the Pacific slope in California during the winter months. The young squirrels do not hibernate throughout the winter months in some areas of California.

DISCUSSION

Investigations of the circumstances which may influence the epizoology and epidemiology of plague have been carried on concurrently in the field and in the laboratory.

All of the laboratory studies confirm previous findings that *Pasteurella pestis*, the specific cause of plague, exhibits consistent characteristics which do not permit of differentiation of strains recovered from rats, from other rodents, from fleas, or from man. These investigations have also established the fact that each of a number of species of fleas may serve as vectors of the disease for different rodent hosts. Fleas of some species do not become infectious as rapidly as those of others under experimental surroundings, and some feed with greater avidity than others on host species which are accidental and not specific to them.

It is evident that foci of bubonic plague among rodents of several genera are widely scattered throughout the area within the north and south boundaries of the United States, and from the Pacific Ocean to approximately the 102d meridian W.[6] The extent and number of foci have not been determined by the limited resources available and the methods necessarily applied, but that which has been determined suggests that both the extent and number of foci are greater than those recorded. It appears also that the infection is enzootic in these areas, and that it has spread easterly from the Pacific Coast. The rapidity of dissemination which has occurred cannot be estimated, but it seems likely that further advancement eastward will be slow, and in terms of years.

Shortly after it was discovered that ground squirrels were infected in California, extensive examinations were made, over the course of a few years, of the rodents in counties north of the Sacramento River, and in the southern counties which were more remote from the San Francisco area. Infection was not found among them. Ten to fifteen years later, squirrels which were collected from both northern and southern counties were found to be infected. After it was learned in 1936 that animals were infected in other western states, the examinations were extended to all of the Rocky Mountain States as far as the Great Plains. No infection was found in the eastern portion of the Rocky Mountain States nor in the Plains States after repeated surveys in the likely areas until within the past 3 years. The range of some rodents is more extensive than that recorded several years ago, and observations have been made by competent officials of migration by rats and ground squirrels over distances of five or more miles within relatively brief periods.

[6] Corresponding to a longitude 25 miles east of the west boundary of Kansas.

Thus far, infected animals have not been discovered east of the 102d meridian W., though repeated surveys have been made of much of the intervening territory as far as the 100th meridian W., and to a farther extent, north of the Missouri River.

There are two probable factors in the perpetuation, and extension, of the disease: the persistence of the infection in fleas for several months, and thus through the winter, in nests and burrows of colonizing and hibernating rodents; and a continuance of the disease through the sporadic infection of those rodents which do not hibernate.

Thirty to forty percent of 200 fleas have survived for 4 months in the nests of ground squirrels which hibernated in the laboratory at a constant temperature of 40° F. The surviving fleas commenced active breeding promptly when removed from the nest and brought immediately to a temperature of 60° F. Under the same conditions, 10 to 12 percent of 200 infected fleas survived, but half of these died within a few days after removal from the nest. The infected fleas did not transmit the disease to hibernating squirrels, nor to other animals on which the survivors among them fed, subsequent to removal from the nest of the hibernating animal. It has been determined that an infected flea will transmit the disease 4 months after having become infected if it is maintained during the interval under favorable conditions, which include periodic feedings on a host. Furthermore, it has been found that one infectious flea will transmit the disease to each of several animals on which it feeds, though it may not infect all of them.

These observations indicate that though a large number of infected fleas may clear themselves or die during the winter, there are survivors. Some of these survivors may be infectious, and the most favorable opportunities for the infection of several animals by one or a few infectious fleas are afforded among the relatively dense populations of colonizing rodents, particularly when the density is greatest at the time of birth of the young.

It is very improbable that the disease is disseminated beyond the colony of hibernating animals during the winter, but infected rodents and fleas have been found repeatedly in the spring soon after the termination of hibernation, and with the emergence of the young from the burrows.

It has been reported that plague may be carried through the winter as a subacute or chronic infection of the hibernating animal, and that an acute recrudescence may occur in the animal with the change of its mode of life, or with pregnancy, upon the termination of hibernation in the spring. No evidence has been obtained during these surveys to support the opinion that a rodent carrier of subacute or chronic plague is a factor in the perpetuation of the enzootic. No

success has attended efforts to infect fleas on an animal which has not developed a bacteremia of marked degree, and it would appear, therefore, that the development of an acute recrudescence in the carrier of the quiescent disease would be necessary to the infection of the flea vectors. This premise is difficult to prove or to examine.[7]

Neither extensive nor systematic surveys have been conducted during the winter months, and plague has been found but rarely among nonhibernating field animals during this season. It has been found among them early in the spring, as well as at later periods, in locations which are relatively distant from colonies of hibernating animals. It has also been found among different genera of nonhibernating animals in the same location for as many as three successive seasons. Sharp epizootics which have devasted and apparently extinguished local populations of prairie dogs have been encountered, but infected nonhibernating rodents remained in the area. Infected rats, meadow mice and fleas have been collected during December on the Pacific slope of Washington. These several observations have led to the assumption that the nonhibernating animals serve to perpetuate the disease during the winter and to assist in its dissemination. The ranges of different genera of the nonhibernating rodents overlap, but as a group they extend across the continent, and species of fleas which infest some of them are capable vectors. There is no evidence at hand that the rodent species of the more eastern habitats are resistant to infection with plague, or that the fleas which are specific to them are not capable vectors. On the contrary, it is probable that these animals can furnish the means of spreading the disease among rodents and into human habitations which they enter, from the Pacific Ocean to the Atlantic.

The rapidity of extension eastward will probably be influenced by the density of the rodent populations and the persistence from year to year of foci in which acute outbreaks recur. The dense focal populations of the principal colonizing ground squirrels and prairie dogs do not extend much beyond the 97th meridian W.[8] in significant numbers. Beyond this limit, any extension must occur in the noncolonizing rodents. However, among these, meadow mice (*Microtus*), pack rats (*Neotoma*), cotton rats (*Sigmodon*), rice rats (*Orizomys*), and Norway rats (*Rattus*) develop large, relatively dense, populations, occasionally or periodically.

The introduction of infectious fleas into such populations may be followed by an acute outbreak and an enzootic focus. There is,

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[7] One male squirrel which was inoculated with plague during its hibernation developed a small area of infection at the site of the inoculation. On emergence from hibernation, the animal remained well. When examined at autopsy, a pigmented scar was present at the site of inoculation. Another which was inoculated under similar circumstances died within 2 weeks with acute plague.

[8] Corresponding to a longitude 75–100 miles west of the western boundary of Minnesota.

however, no assurance that such a series of events will occur, since there are some specific conditions known, and doubtless others unknown, which must be favorable to assure the production of the disease. Thus, the infection of a high percentage of fleas is accomplished consistently only by placing them on an animal within a few hours of its death from bacteremia, after having starved the fleas for a few days. Many fleas will not feed within less than 48 hours. A large number of those which feed on infected blood clear themselves of it without becoming infectious, others retain the infection for periods of weeks. In most instances, if not in all, an interval of from a few days to 3 or 4 weeks elapses after feeding the infected blood before the flea transmits the infection by biting, though it feeds on susceptible hosts in the interval. This interval varies with different species of fleas and is probably influenced also by the temperature of the surroundings of the flea in the burrow, nest, or runway.

It will be apparent that an element of chance enters into the fulfillment of conditions favorable to the progressive spread of the disease. Nevertheless, it has been disseminated over large areas of the United States which are relatively adjacent to one another, and the possibilities of its introduction into new and more remote areas through migrations and through the channels of commerce and transportation are deserving of continuous and expectant attention.

ULTRAVIOLET IRRADIATION IN THE PRODUCTION OF POTENT ANTIRABIES VACCINES [1]

By Karl Habel, *Surgeon, United States Public Health Service*

The use of ultraviolet irradiation as a means of inactivating rabies virus for the production of antigenic vaccines was first tried by Hodes, Webster, and Lavin (*1*). Subsequent publications of Webster and Casals (*2, 3, 4, 5*) developed the practicability of irradiated rabies vaccine in the prophylaxis of rabies in man and dogs. This work was done with virus inactivated by the irradiation from either low-pressure mercury vapor or resonance lamps, and the method of exposure of the virus was by means of a rotating quartz flask. More recently, Oppenheimer and Levinson (*6*) have developed a new type of mercury vapor lamp which emanates a relatively large percentage of its total energy output in wave lengths shorter than 2,000 angstrom units. Levinson et al. (*7*) reported on experiments with this type of lamp in the production of highly antigenic rabies vaccines. The

[1] From the Division of Infectious Diseases, National Institute of Health.

method of exposure in their experiments involved a continuously flowing thin film of virus suspension.

The purpose of this study is to investigate further the properties of the Oppenheimer-Levinson type of lamp and exposure chamber insofar as rabies vaccine production is concerned, and to check the limitations of the method as well as of the vaccine so produced.

METHODS

Preparation of virus emulsions.—The brains of rabbits and mice infected with rabies were harvested at the time the animals showed complete prostration after an intracerebral inoculation of fixed rabies virus. The brains were emulsified in suspensions of various concentrations in buffered salt solution by the use of a Waring blender. Some emulsions were filtered through gauze or 200-mesh screen; others were used without filtration.

Ultraviolet irradiation.—The details of the lamp and exposure chamber set-up of the Oppenheimer-Levinson type have not as yet been released by the Committee on Medical Research of the Office of Scientific Research and Development.

Exposure to the lamp is made by use of a thin-walled quartz chamber whose inside measurements are approximately 1 cm. $\times$ 12.5 cm. $\times$ 0.2 mm. Material to be exposed flows in a continuous stream through this chamber, placed 1 cm. from the lamp. After passing the lamp the material is no longer exposed to the irradiation.

Virus emulsions were exposed for varying periods. That exposure which represented the shortest time necessary to completely inactivate all virus was used for potency testing.

The low-pressure lamp apparatus consisted of a bank of eight 15-watt germicidal lamps (*8*). Material to be exposed was placed in a quartz flask rotated slowly in the middle of the bank of lamps.

When comparative tests were run with the two types of lamps on the two methods of exposure, a single resonance lamp was used with the thin-film chamber, and the quartz flask was placed beside the Oppenheimer-Levinson lamp. When long exposures (over 2 seconds) were desired with the chamber-type of exposure, two chambers were connected in series, and the material passed the lamp two times.

Inactivation by chemical agents.—Whenever comparisons were being made between irradiated and chemically killed virus, the same original brain emulsion was divided into equal parts. Phenol and chloroform were used at a 1-percent concentration. The phenolization took place at 37° C., and chloroformization at 4° C. Samples were removed at various intervals, diluted to a 5-percent emulsion and stored while being tested for viability. That sample in which the virus was killed

by the shortest exposure to each chemical agent was the one used as a vaccine.

Demonstration of viability of virus.—All inactivated materials were checked for viable virus by intracerebral inoculation of five young Swiss mice. Samples were diluted to the equivalent of a 5-percent emulsion before the mice were inoculated. These animals were observed for 3 weeks.

Potency test of immunizing power of vaccines.—A mouse test previously described (*9*) was used for determining potencies of vaccines. All vaccines were diluted to the equivalent of a 0.5-percent emulsion, and six doses of 0.25 cc. each were given intraperitoneally every second day to Swiss mice (13–15 gm.). The intracerebral test dose of serial tenfold dilutions of fixed virus was given on the fourteenth day after the first dose of vaccine. The degree of protection is expressed as the number of LD_{50} resisted by the immunized mice.

INACTIVATION OF VIRUS

Ultraviolet irradiation.—The Oppenheimer-Levinson lamp and chamber was used. Six runs were made in each of which at least five samples were removed following varying lengths of exposure. Each sample was tested for viability in mice. In table 1 it is seen that the exposure necessary to completely inactivate rabies virus was between 0.34 and 0.72 seconds, with brain emulsions at 5-, 10-, or 20-percent concentration. There appeared to be no demonstrable difference in the time necessary to kill in these three different concentrations.

TABLE 1.—*Exposure necessary to inactivate rabies virus emulsions by irradiation and chemical treatment*

Brain emulsion	Titer of original emulsion	Exposure necessary to inactivate		
		Ultraviolet	1-percent phenol	1-percent chloroform
20-percent mouse brain, whole emulsion	10^{-5}	0.34 second	Less than 10 hours	21 days.
20-percent mouse brain, supernatant	10^{-5}	0.41 second	Less than 4 hours	21 days.
10-percent mouse brain, whole emulsion	10^{-4}	0.52 second	Less than 3 hours	
10-percent mouse brain, whole emulsion	10^{-6}	0.72 second	6 hours	
5-percent mouse brain, whole emulsion	10^{-5}	1.7 seconds [1]	6 hours	
5-percent rabbit brain, whole emulsion	10^{-5}	0.36 second	12 hours	
5-percent rabbit brain, whole emulsion	10^{-5}	0.5 second	3 hours	
5-percent mouse brain, whole emulsion	10^{-6}	1.2 seconds [1]	6 hours	

[1] Given one fixed exposure.

Phenol inactivation.—One-percent phenol at 37° C. completely inactivated rabies virus in emulsions of 5, 10, and 20 percent after from 3 to 12 hours' exposure.

Chloroform inactivation.—One-percent chloroform at 4° C. required 21 days' exposure to kill virus in a 20-percent emulsion.

IMMUNIZING POTENCIES OF VACCINES

Comparison of irradiated with chemically inactivated vaccines.—In table 2 is shown a typical protocol of an immunity test in mice com-

TABLE 2.—*Typical potency test protocol: Ultraviolet-irradiated vaccine compared with phenolized vaccine*

Vaccine	Fixed virus test dose, dilutions inoculated intracerebrally							50-percent endpoint	MLD protection
	10^{-1}	10^{-2}	10^{-3}	10^{-4}	10^{-5}	10^{-6}	10^{-7}		
Irradiated	[1] 3/12	2/11	4/10	0/8	0/11	-----	----	1/10	247,000
Phenolized	5/9	6/10	3/7	2/8	0/6	----	---	1/190	13,010
Controls	--------	--------	--------	-----	7/7	5/7	1/7	1/2,472,000	------

[1] Number of mice with rabies over total mice in each group.

paring samples from a single brain emulsion which were completely inactivated by irradiation and by phenol. A summary of the results of eight such potency tests is given in table 3, in which are included six comparisons of irradiated and phenolized vaccines made from the same brain emulsions, and two comparisons between irradiated, phenolized, and chloroform-killed vaccines.

The degree of immunizing potency of the irradiated vaccines was invariably greater than that of the chemically inactivated vaccines from the same suspension.

TABLE 3.—*Summary of comparisons of potencies: Ultraviolet compared with chemically inactivated vaccines*

Experiment	Titer of original emulsion	Concentration of emulsion inactivated (percent)	MLD protection by mouse test		
			Ultraviolet	Phenol	Chloroform
Experiment No. 1	10^{-6}	5	247,000	13,010	-------
Experiment No. 2	10^{-5}	5	30,200+	8,028	------
Experiment No. 3	10^{-5}	20	339,500	176	70,241
Experiment No. 4	10^{-5}	10	11,476	54	160
Experiment No. 5	10^{-4}	10	38,045	25	---------
Experiment No. 6	10^{-6}	10	96,830	--------	---------
Experiment No. 7	10^{-5}	5	9,611	334	---------
Experiment No. 8	10^{-6}	20	5,585+	--------	---------
Experiment No. 9	10^{-6}	5	49,780+	35	---------
Experiment No. 10	10^{-5}	20	67,700	9,580	---------

Effect of virus titer on potency of vaccines.—In table 3 there is shown a tendency of the immunizing potency of the irradiated vaccines to be directly related to the titer of virus in the original brain emulsion. This is also shown for the phenolized vaccines and has been pointed out in a previous publication (*10*). The difference, however, between the two methods of inactivation lies in the fact that even with the low titer emulsions, irradiation still gives a potent vaccine, whereas phenolization does not. In the case of experiment No. 4, the virus was in the form of supernatant only, not a whole brain emulsion. Yet after

the virus was killed by irradiation it still had a protection potency against over 11,000 LD_{50} of virus, whereas phenolization and chloroformization of the same supernatant gave little immunizing potency (protection against 54 and 166 LD_{50} of virus).

Potencies of vaccines irradiated at different concentrations of brain emulsions.—Just as the concentration of the brain emulsions seemed to make no difference in the irradiation exposure necessary to completely inactivate the virus, the immunizing potencies were equally high with the different concentrations of emulsions (see table 3).

Potency of irradiated vaccine against preimmunization street virus inoculated intramuscularly.—In a single experiment, 20 guinea pigs received 0.25 cc. of a 1/10 brain emulsion of third monkey-passage street virus in the gastrocnemius muscle. Ten of these animals were then given 0.1 cc. of irradiated vaccine No. 8 subcutaneously daily for 14 doses. One of the vaccinated guinea pigs died and was Negri positive, whereas 4 of the 10 controls died of rabies.

Potency of irradiated vaccine against preimmunization fixed virus inoculated intramuscularly.—A group of 245 mice was divided into 7 subgroups and given 0.03 cc of from 1/4 to 1/256 dilutions of an intramuscular strain of rabies fixed virus into the gastrocnemius muscle. Beginning the same day and continuing daily for 14 days, the mice received 0.05 cc. of irradiated vaccine No. 3 subcutaneously. The 50-percent endpoint in the control mice was 1/256 and that in the vaccinated mice 1/202, showing no protection.

In mice the incubation period following this strain of fixed virus given intramuscularly is relatively short—about 7 days. This experiment, therefore, was repeated in guinea pigs, using a guinea pig-adapted intramuscular fixed virus. The gastrocnemius muscle of groups of five guinea pigs each (200–250 gm.) were inoculated with 1/10, 1/20, 1/40, 1/80, and 1/160 dilutions of fixed virus. The treated groups then received daily doses of 0.1 cc. of irradiated vaccine No. 8 subcutaneously for 14 days. The vaccinated animals survived 3 LD_{50} of virus which by this method of testing represents a significant degree of protection.

Serum antibody response of guinea pigs following immunization with irradiated vaccine.—Twenty-five guinea pigs were bled 30 days after receiving 14 daily doses of irradiated vaccine No. 8 (0.1 cc., subcutaneously). The serum was tested by the complement-fixation, virus-neutralization, and virus-protection tests previously described (*11*). The serum titered 1/32 (3+ fixation) by complement fixation. By the virus-neutralization technique in mice 0.03 cc. of serum neutralized at least 10,000 LD_{50} of virus. The mice were protected against 4 LD_{50} of intramuscular virus in the virus-protection test.

Potency of irradiated vaccines as related to overexposure of virus.—In order to determine the safety factor in over-irradiating the virus beyond the point necessary just to inactivate, the experiments shown in table 4 were done. In experiment No. 2, the vaccine was irradiated about eight times as long as necessary just to kill the virus. This vaccine gave an immunizing protection against only 709 LD_{50} of virus as compared to 30,200 LD_{50} for the vaccine in which the virus was just inactivated. However, in experiments No. 3 and No. 4, exposures two and five times that necessary just to kill resulted in little change in the immunizing potencies of the vaccines.

TABLE 4.—*Effect of over-irradiation of rabies vaccines on their potency*

Experiment	Concentration of emulsion (percent)	Exposure	Potency [2]
Experiment No. 2	5	0.36 second [1]	30,200+
		2.7 seconds	709
Experiment No. 3	20	0.34 second [1]	339,500
		0.72 second	169,750
Experiment No. 4	10	0.52 second [1]	38,045
		2.5 seconds	48,285

[1] Exposure necessary just to inactivate virus.
[2] MLD protection by intracerebral mouse test.

Preservation and storage of irradiated vaccines.—Two experiments have been completed in which various preservatives were added to a suspension of rabies-infected brains already inactivated by ultra-violet irradiation. The results are shown in tables 5 and 6. Equivocal results were obtained in regard to the effect of storage at 4° C. on the vaccine alone without the addition of any preservative. In the first experiment the potency was completely destroyed after 6 months, whereas in the second test (table 6) the potency held up better than the samples to which preservatives had been added. However, the experiments were consistent to the extent that the process of lyophiling the irradiated vaccine caused an initial drop, due to the procedure

TABLE 5.—*Storage experiment with various preservatives added to ultraviolet-inactivated vaccine*

Time of potency test	No preservative	No preservative, lyophiled	0.5-percent phenol	0.5-percent chloroform	0.25-percent tricresol	1/10,000 merthiolate	0.1-percent formalin
Protection at time of production	[1] 49,660	7,412					
Protection after 6 months' storage at 4° C	1	4,080	7,047	5,008	7,047	7,017	0

[1] LD_{50} protection by intracerebral mouse test.

TABLE 6.—*Storage experiment with various preservatives added to ultraviolet-inactivated vaccine*

Time of potency test	No preservative, pH 7.0	No preservative, pH 7.0, lyophilized	No preservative, pH 7.6	0.5-percent phenol	0.5-percent chloroform	0.25-percent tricresol	1/10,000 merthiolate	0.1 percent formalin
At time of production	106,830	2,717						
After 6 months' storage at 1° C	10,513	8,191	51,511	7,[illegible]68	87,861	[illegible]28	3,938	2,227

[1] LD_{50} protection by intracerebral mouse test.

itself; but once dried, the potency then held fairly well. Formalin in a concentration of 0.1 percent was definitely detrimental to preservation of potency, whereas 0.5-percent phenol, 0.5-percent chloroform, 0.25-percent tricresol, and 1/10,000 merthiolate seemed almost equivalent in preserving potency. Merely adjusting the pH to 7.6 in the one experiment seemed to enhance the ability of the vaccine to withstand storage. Levinson et al. (7) have found storage with merthiolate as a preservative to be satisfactory.

Comparative potency tests of vaccines made with different lamps and different methods of exposure.—There would appear to be two new principles involved in the irradiation technique developed by Levinson and Oppenheimer, namely, a lamp of high energy intensity which consists partially of light with a wave length less than 2,000 angstroms and, secondly, an exposure chamber giving maximum exposure to a continuously flowing, very thin film of material. The question arose as to which of these two deviations from the usual irradiation technique was responsible for the high potencies of the vaccines so prepared. An experiment was set up in which a single batch of brain emulsion was exposed by means of the thin-film chamber to the Levinson-Oppenheimer lamp and to a single low-pressure resonance lamp. The same emulsion was also exposed to each of these lamps by means of a rotating quartz flask, except that with the rotating flask a bank of eight low-pressure resonance lamps was used, the flask being placed in the center so as to receive irradiation from all directions. Samples of virus exposed for varying lengths of time were tested for viability by intracerebral inoculation of mice, and the samples just inactivated were then used for potency tests. In table 7, it is seen that high potencies are correlated with the use of the thin-film exposure chamber rather than with the type of lamp. Also it is obvious that in spite of a thousandfold differential in ultraviolet energy output of the two lamps, the differential in exposure time necessary to kill rabies virus was only about tenfold when the thin-film chamber was used.

TABLE 7.—*Comparison of potencies of irradiated rabies vaccines prepared by minimal-inactivating exposure to two types of lamps with two exposure techniques*

Type of exposure	Experiment No. 1		Experiment No. 2		Experiment No. 3	
	Time of inactivation	Potency [1]	Time of inactivation	Potency [1]	Time of inactivation	Potency [1]
High-pressure lamp, quartz chamber	0.52 second	38,045	0.72 second	96,830	1.7 seconds	9,611
Low-pressure lamp, quartz chamber	2.1 seconds	73,852	8.4 seconds	23,560	5 seconds	68,240
High-pressure lamp, quartz flask	20 minutes	2,151	20 minutes	9,185	30 minutes	0
Low-pressure lamp, quartz flask	10 minutes	25,110	30 minutes	13,160	30 minutes	3,159
Titer of original emulsion	1/35,340		1/3,163,000		1/421,700	

[1] LD_{50} protection against intracerebral fixed virus in mice.

DISCUSSION

The results of these experiments confirm those of Levinson et al. that rabies vaccine irradiated by the Levinson-Oppenheimer technique is consistently more potent than phenolized vaccine made from the same original brain emulsion. The potencies of rabies vaccines so produced are substantially greater than those produced by other techniques of irradiation. Webster's irradiated vaccines usually had a potency of less than 10,000 MLD, and his method was not practical from the standpoint of large-scale manufacture of rabies vaccines. The continuous flow technique used in these experiments, however, is adaptable to commercial-scale production.

Potency of the irradiated vaccine can be demonstrated by the standard intracerebral test and against both street and fixed virus, given intramuscularly when vaccine is administered after the virus is introduced. Serum antibody response to the vaccine in guinea pigs is also of a high titer.

As pointed out previously by Levinson et al., the safety factor in overexposure of rabies vaccine by this method is rather large. Up to five times the amount of irradiation necessary to inactivate the virus apparently does not appreciably reduce the immunizing potency of the vaccine.

The vaccines produced by this method are free from the presence of any deleterious chemical agent left after the inactivation process and are relatively stable in the presence of proper preservatives. It is a practical method of preparing rabies vaccines for canine as well as for human use since emulsions as heavy as 20 percent are easily and quickly inactivated and retain high immunizing potency.

The fact that relatively low-titer emulsions and even cell-free supernatants have a satisfactory immunizing potency when attenuated by this irradiation technique offers promise of a purified rabies vaccine in which the potency is still high.

Tests comparing the Levinson-Oppenheimer lamp with a low-pressure resonance-type lamp indicate that the increased potencies of vaccines attenuated by this new irradiation technique depend not on the shorter wave lengths of the new type of lamp but upon the method of exposing the virus to either type of irradiation in the thin-film continuous-flow chamber devised and used by Levinson and Oppenheimer. This chamber gives inactivation with less exposure than with other types of exposure apparatus. The ultraviolet passes through a very thin layer of highly purified quartz before reaching the virus material. The film of virus suspension exposed is only 0.2 mm. thick, and because of the continuous flow no part of the virus is reexposed past the point of inactivation. These, then, seem to be the important factors in accomplishing inactivation of rabies virus by ultraviolet irradiation with preservation of high antigenicity in the production of rabies vaccines.

SUMMARY

(1) Highly potent rabies vaccines were prepared by use of the Levinson-Oppenheimer ultraviolet technique and apparatus in the irradiation of rabies brain suspension.

(2) Irradiated vaccines were consistently more potent than comparable phenolized vaccines.

(3) Whole-brain emulsions as heavy as 20 percent were inactivated by this method of irradiation.

(4) The potency of the irradiated vaccines was satisfactorily preserved in storage at 4° C.

(5) The important factor in this technique of irradiation apparently was the use of the thin-film chamber as a means of exposing materials.

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PRELIMINARY STUDIES ON THE CONTROL OF BLOWFLIES WITH DDT [1]

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Preliminary studies on the use of DDT in the control of several species of blowflies (*Calliphoridae*) were made to gain information on methods of application, the effectiveness of the spray material, and the duration of effective control.

The tests were made in a varied group of establishments that included a retail fish market, an abattoir, a seafood plant, and a hide-processing plant. Of the several species of flies found present, those of the genera *Cochliomyia* and *Lucilia* were most common.

The habits of the blowfly vary greatly from those of the housefly, and alterations of the techniques of spray application are necessary. Some of the habits of blowflies to be considered in the effective use of DDT sprays are: The use of scattered night resting places, such as on the sides of buildings, under eaves, in open sheds, under miscellaneous trash materials, and especially on the upper portions of such vegetation as weeds, bushes, and small trees near the daytime feeding places of the blowflies; a preference for putrefying food material, such as offal, fish, blood, and decaying fruits and vegetables; the ability to fly for great distances; the tendency to alight only on food and to fly from one piece to another without resting to any appreciable extent on the flooring, walls, and ceiling; and the infrequency with which blowflies enter buildings.

In all operations a 5-percent-DDT emulsion was used. It was made by adding 6 gallons of water to 1 gallon of a stock solution containing 35-percent DDT (w/v) dissolved in xylene, with 4 percent of the emulsifier Triton X–100 [2].

[1] From Communicable Disease Center, Technical Development Division (Savannah, Ga.), States Relations Division.
[2] An aralkyl-polyether alcohol manufactured by Rohm & Haas Co., Philadelphia, Pa.

In estimating the pretreatment and posttreatment fly-population indices, the grill-device method of sampling was used[3]. This method consisted of placing a 3-foot-square grill work, consisting of alternate ¾-inch slats and open spaces, on any surface attracting a concentration of flies. After the flies had been aroused and had resettled, the number of flies resting on the grill was counted. Five such counts were made at the points of maximum concentration in each of several areas. From each location, the maximum count was taken, and from these maxima, a definite number (approximately three-fourths) of the highest counts were averaged to give an index figure of maximum fly nuisance.

The use of the grill device is not so satisfactory for sampling a blowfly population as it is for sampling houseflies, since blowflies do not remain on the grill as long as houseflies. Soon after alighting, they tend to pass through the open spaces of the grill and go to the attractant beneath it. This is especially true when large numbers are present, and competition for an undisturbed resting or feeding place is indicated. Consequently, with heavy concentrations, one has time to count only the most representative quadrant of the grill, and to use the number thereon as one-fourth its entire capacity.

Even with this disadvantage, this method was still superior to any other sampling method tried. Its advantages over the well-established bait trap, sweep net, and other methods are that it does not attract flies but samples those already present; it does not drive the flies away by violently disturbing them; it is mobile and permits the sampling of a population wherever the maximum concentrations occur; it does not depend upon a competitive attractant; it is a time saver in that samples can be taken very rapidly; and it is easily and cheaply constructed.

In all inspections only the blowflies were counted. Other flies, such as the housefly and the stablefly, were not included in the grill counts.

PROCEDURE AND RESULTS

The initial work on blowflies was done at a fish market and at an abattoir. In the former the principal focal point for blowflies was a loading platform used for the uncrating and washing of fish. Twice daily the platform was washed off, but much of the scrap fell through openings in the wooden planking. This resulted in an accumulation beneath the low platform, which attracted flies and made possible their breeding on the premises. The garbage containers were kept at one end of the platform, but they were not always covered or

[3] Scudder, H. I. A new technique for sampling the density of housefly populations Pub. Health Rep., *62:* 681-686 (May 9, 1947).

emptied regularly. Next door to the fish market was a large open-air vegetable stand.

On August 21, 1945, the walls and the ceiling over the platform were treated at the customary rate of 200 mg. of DDT per square foot, and the wooden platform and cement apron fronting it were treated at the rate of 300 mg. per square foot. The purpose of this higher dosage was to maintain a DDT residue for a longer period of time on the platform and apron, which were washed daily.

Treatment was made with a nozzle, producing a fan-shaped spray pattern with an 80° dispersion angle and having a discharge rate of 0.4 gallon per minute at 40 pounds, pressure.

Pretreatment and posttreatment population indices were determined at weekly intervals. In the inspections over an eight-week pretreatment period, the blowfly indices ranged from 32 to 115 flies. In the first 2 weeks subsequent to treatment satisfactory control was obtained. In the third week the population index approached the lower limits of the pretreatment indices. In the fourth and fifth weeks the index was well within the limits of the pretreatment indices (table 1).

Six weeks after the initial treatment the platform and cement apron were again sprayed at the rate of 300 mg. per square foot.

During the first 3 weeks after the supplemental treatment the fly control was again satisfactory. Four weeks after treatment the population level approached the lower limits of the pretreatment indices, and in the sixth week the index was above that of the pretreatment average. It is believed that, had a hedge and some bushes on the adjoining property to the rear of the platform been treated, more satisfactory results and a longer period of effective control would have been obtained.

In studies at an abattoir it was observed that large numbers of calliphorids were attracted to an open waste tank, where infrequent removal of material permitted breeding to such an extent that a layer

TABLE 1.—*The effect of a DDT residual treatment on the population indices of calliphorids when applied to a fish-market loading platform and its environs at the rate of 200 and 300 mg. per square foot*

Item	Pretreatment period						Treated August 26, 1945	Posttreatment period					Treated October 1, 1945	Post-supplemental-treatment period				
	June	July			August			Aug.	September					October				Nov.
Inspection date	30	12	20	25	9	13		28	6	12	20	25		2	9	25	31	13
Number of weeks before and after treatment	8	6	5	4	2	1		1	2	3	4	5		0	1	3	4	6
Weekly fly index	43	115	58	48	32	60		12	5	25	34	46		6	1	3	26	88

PLATE I

FIGURE 1.—A seafood plant with collections of shrimp, crab, and oyster wastes constituting a blowfly attractant and breeding place. The tree in the foreground made an ideal night resting place for blowflies.

FIGURE 2.—An abbatoir with collections of hair and intestinal wastes in which dense breeding of blowflies occurred.

of mature maggots, three-fourths of an inch deep, was commonly observed on the surface. From a second-story platform above the tank there was considerable spillage of waste materials to a cement apron below. Periodically this material was hosed off the cement apron onto an earthen bank, where it constituted a suitable medium for further breeding.

To exercise some control over the number of flies present, an application of the 5-percent-DDT emulsion was made at the rate of approximately 200 mg. per square foot to the tank, the walls of the building about the tank, the cement apron, and the partially open rendering room adjoining the tank. Also sprayed were the walls and ceiling over a loading platform that was located about 250 feet from the tank. Numerous blowflies were often observed on this platform feeding on blood-stained wrapping paper that was carelessly piled in any convenient location.

Prior to treatment early-season inspections revealed indices of 17 to 96.5 blowflies. One week after treatment the adult emergence was still so great that the blowfly index remained above 15, a number arbitrarily established as a maximum for satisfactory control. In the second week following treatment, and thereafter for 7 weeks, effective control of the flies was maintained. During the inspection trips of the eighth and ninth weeks after treatment, sanitation at the plant was observed to be very poor. Inspections on the ninth and tenth weeks showed a substantial increase in the number of flies present, but a few weeks after normal sanitary practices were resumed, the fly population receded to a point at which it approximated the early post-treatment level.

Three months after treatment a fire destroyed a considerable portion of the plant, including several of the refrigeration units, so that much of the stored meat was spoiled and had to be removed for rendering. During the month that followed, routine sanitary operations were not performed and there was a great increase in the number of flies.

A second treatment was made on October 24 (4 weeks after the fire), at the rate of approximately 300 mg. DDT per square foot of surface, and the DDT was applied with a power sprayer at 200 pounds' pressure. The waste tank, cement apron, the grasses for about 25 feet from the banking at the edge of the cement apron, the rendering room, and the nearby work shop were sprayed.

One week after treatment there was a substantial reduction in the number of flies, but the population was considered to be still above a satisfactory level of control. During the third and fourth weeks the population level was satisfactory in spite of the poor sanitation that still prevailed. After this time the cool autumn nights began to slow

TABLE 2.—*Pretreatment and posttreatment weekly blowfly indices determined by the grill method at an abattoir treated with a 5-percent-DDT emulsion at the rate of 200 and 300 mg. of DDT per square foot of surface treated*

Item	Pretreatment period						Sprayed June 28	First posttreatment period										Fire Sept. 21	Period after fire			Sprayed Oct. 24	Second posttreatment period		
	May			June				July			August				September				September	October			October	November	
Inspection date	10	17	25	7	13	21		7	12	27	2	9	21	24	1	8	14		29	7	23		29	6	13
Number of weeks before and after treatment	7	6	5	3	2	1		1	2	4	5	6	7	8	9	10	11		1	2	4		1	2	3
Weekly index	28.7	29.5	31.5	96.5	58.2	17.0		26.8	3.5	4.3	8.8	6.3	2.0	2.0	54.0	180.0	3.7		7.5	100.0	238.0		38.0	7.5	7.5
Period index	48.6							12.9											115.2				17.7		

up fly activities, and further data on effectiveness could not be accurately determined. (See table 2.)

In the latter part of the season inspections were made at a hide-processing plant that served several of the neighboring counties, processing green hides and rendering fats and condemned meats. On the premises large numbers of adult calliphorids were found frequenting the green hides and renderable waste products. Under the hides in the main building, in the stored rendered products, and in the soil into which hide scraps and putrefying juices had been penetrating over a period of time, considerable numbers of fly larvae were found developing. A little over one-fourth mile away, a distance which is within easy flight range for most calliphorids, there was a large untreated abattoir where a very high population of calliphorids was always present.

Because of the lateness of the season both pretreatment and posttreatment inspections were made semiweekly. Prior to treatment a night inspection of the premises was made to determine the resting locations of the blowflies, so that more effective application of the spray material could be made. It was found that the night resting places included a wide range of locations. In the main processing building that was closed before dark the flies were found on the side walls, boxes, beams, wires, etc., but generally not on the hides that they frequented during the day. Because of the height of the ceiling, the number of flies resting thereon could not be observed. In the outbuildings they were found scattered on the ceilings, wires, inner and outer walls, and under the eaves. The greatest concentrations of resting blowflies were found on the upper parts of grasses and shrubbery and in small trees near their daytime feeding places.

On October 18 the above locations were treated with a 5-percent-DDT emulsion. An orchard-type spray gun was used to reach the ceilings and to spray the grasses around the plant. The exact rate of application could not be determined because of the waste of spray material involved in such an operation, but it was approximately 300 mg. of DDT per square foot of surface treated.

Prior to treatment the semiweekly fly indices varied between 167 and 207 blowflies. Subsequent to treatment a great reduction was in evidence, and inspections gave indices of 1.5 to 3.3 flies (table 3).

Posttreatment inspections throughout the day showed that prior to the delivery of green hides, between midmorning and noon, there were no flies on the premises. At midday, after the delivery of the green hides, a few flies were present. Apparently these flies were transmitted along with the delivery of the green hides, as considerable numbers of flies were observed on the trucks as they pulled up to the weighing scales. By late afternoon additional flies were present,

TABLE 3.—*Pretreatment and posttreatment blowfly indices at a hide-processing and fat-rendering plant treated with a 5-percent-DDT emulsion at the rate of 300 mg. of DDT per square foot of surface treated*

Item	Pretreatment period					Sprayed Oct. 18	Posttreatment period						
	October						October				November		
Inspection date	7	9	11	12	17		19	21	25	29	1	9	14
Weekly inspection index	167.0	209.0	188.0	170.0	194.0		32.0	3.5	1.5	4.5	12.5	33.0	13.0
Period index			185.6							14.3			

apparently having migrated from neighboring sources. This posttreatment pattern, entirely different from the pretreatment all-day high levels, was constant during the period of observation.

The duration of effectiveness could not be estimated at this establishment due to the onset of the cool nights of autumn and the subsequent seasonal drop in fly populations.

In seafood plants most operational activities take place between autumn and spring, with only a minimum of activities being performed during the hot summer months. Consequently, the fly problems at such plants occur in the spring and autumn months. During these periods the large amount of waste products, primarily from shelling crabs and oysters, provides conditions conducive to a rapid increase in blowfly populations.

In one seafood plant work was commenced during the latter part of September. Two weekly inspections during the first part of October gave blowfly indices of 207 and 200 flies, respectively. Prior to treatment, early morning and night observations indicated that a very large proportion of the blowflies rested at night in the small trees and shrubbery near the oyster house, much the same as had been the case at the hide and rendering plant. On October 19 the trees and shrubbery, upper and under sides of the wharf, the crab shells around the wharf, the ceiling of the shelter protecting the crab-boiling pots, and the grasses for a distance of about 25 feet around the oyster house were treated with a 5-percent-DDT emulsion. The spray material was applied at a rate of approximately 300 mg. DDT per square foot of surface treated with an orchard-type spray gun at 200 pounds' pressure.

In the monthly interval between treatment and the advent of cool nights, satisfactory control of blowflies was obtained, as shown by the midafternoon indices in table 4. In the mornings of the first few days following treatment many dead flies were found, especially under the small trees and on the floor of the shelter containing the crab-boiling pots. Throughout the day there was the usual characteristic influx of calliphorid flies from adjacent areas.

TABLE 4.—*Pretreatment and posttreatment indices of blowflies at a seafood plant sprayed with a 5-percent DDT emulsion applied at the rate of approximately 300 mg. per square foot.*

Item	Pretreatment period		Sprayed October 19	Posttreatment period				
	October			October			November	
Inspection date	2	10		24	26	29	7	14
Weekly fly index	207.5	200.5		23.0	22.0	25.5	13.0	33.0
Period fly index	204.0			23.2				

SUMMARY

Preliminary tests were made with DDT for the control of blowflies at a fish market, an abattoir, a hide-processing plant, and a seafood plant, using a 5-percent DDT-xylene-Triton X–100 emulsion applied at a rate of 200 and 300 mg. DDT per square foot. The variation in the degree of control achieved was dependent to a large extent on the relationship between the night resting places of the flies and the extent to which such places were treated. At establishments where only the area about the daytime feeding places of the blowflies was treated, control was obtained for a 2- to 3-week period. At establishments where the night resting places were treated in addition to the area around the daytime feeding places, effective control of the blowflies was obtained for periods up to 3 months.

SMALLPOX IMMUNIZATION REQUIREMENT FOR AIR TRAVELERS TO JAMAICA

Information has been received that as of May 8, 1947, the following requirement is applicable to persons arriving at Jamaica by aircraft from New York.

"Persons who in the opinion of the sanitary authorities are not sufficiently immunized against smallpox will be subject to vaccination on arrival, followed by surveillance for a period which will not exceed fourteen (14) days from the date of arrival of the aircraft."

Notification has also been received that Jamaica will apply a similar requirement to persons arriving from other ports in the United States, including Puerto Rico, immediately upon receipt of information that smallpox exists in those localities.

A NEW *SALMONELLA* TYPE ISOLATED FROM MAN: *SALMONELLA TEXAS* [1]

By JAMES WATT, *Surgeon*, and THELMA M. DECAPITO, *Assistant Bacteriologist, United States Public Health Service*, and ALICE B. MORAN, *Kentucky Agricultural Experiment Station.*

An investigation of the prevalence of various intestinal pathogens is now being conducted in Hidalgo County, Tex. In the course of this work, rectal swab fecal cultures are obtained from a selected group of individuals each month. The specimens are taken in the home and plated directly on SS agar, and the swab is then placed in tetrathionate broth. These cultures are then examined in the laboratory for members of the *Shigella* and *Salmonella* group. In August 1946, the organism described below as *Salmonella texas* was isolated from one of our routinely studied patients.

The patient was a 4-year-old Spanish-American male. He was not sick at the time the culture was taken, but his mother stated that he had been ill with a moderately severe diarrhea from which he had recovered approximately 1 week before the examination was made. The illness lasted less than 1 week. The patient had 10 to 12 bowel movements daily during the acute phase; abdominal pain and anorexia were moderate, and no other symptoms were noted.

The organism isolated was not found on the original SS agar plate but was present in large numbers in the tetrathionate enrichment broth studied the following day. Three cultures, one each in September, October, and November, were obtained from the patient and all were negative for intestinal pathogens. No other members of the family reported any illness, and cultures taken on two of them during this period were negative.

IDENTIFICATION

The organism was a motile rod which possessed the usual cultural and biochemical attributes of the *Salmonella* group, except that it liquefied gelatin in 24 to 48 hours at room temperature. Glucose, arabinose, maltose, xylose, rhamnose, trehalose, mannitol, sorbitol, dulcitol, and inositol were fermented within 24 hours, and acid was produced from cellobiose after 5 days' incubation; lactose, sucrose, raffinose and salicin were not attacked. D-tartrate, l-tartrate, citrate, and mucate were fermented, but l-tartrate was not utilized. Hydrogen sulfide was produced, but indol was not formed.

Serologic examination revealed that the organism was a member of group B of the Kauffmann-White classification. It was agglutinated by serum for factor V but not by serum for factor XXVII. In absorp-

[1] From the Division of Infectious Diseases, National Institute of Health, Pharr, Tex.; and the Department of Animal Pathology, Kentucky Agricultural Experiment Station, Lexington, Ky.

tion tests it left a slight residue of agglutinins in *Salmonella typhimurium* O serum. The somatic antigens of the culture are IV, V, XII.

The organism was diphasic. Phase 1 was agglutinated to the titer of serum derived from phase 1 of *Salmonella thompson* (k) but failed to remove all agglutinins from the serum. After absorption there remained a residue which amounted to 5 percent of the original titer. Phase 2 was agglutinated to the titer of *Salmonella glostrup* phase 2 serum, (e,n,z_{15} . . .) and reacted with absorbed serums for factors z_{15} and z_{17}. In absorption tests the organism again failed to remove all agglutinins from the test serum. The diagnostic formula of *S. texas* is IV, V, XII: k-e,n,z_{15} . . .

SUMMARY

A new *Salmonella* type, *Salmonella texas,* was isolated from the feces of a child who had recovered from an attack of diarrhea 1 week before the examination was made. The diagnostic formula of the organism was IV, V, XII: k-e,n,z_{15} . . . The culture liquefied gelatin.

SMALLPOX IMMUNIZATION REQUIREMENT OF COSTA RICA

According to a telegram dated April 28, 1947, Costa Rica has established a special smallpox immunization requirement. No person is permitted to enter or leave Costa Rica without a certificate of successful smallpox vaccination.

DEATHS DURING WEEK ENDED APR. 26, 1947

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Apr. 26, 1947	Corresponding week, 1946
Data for 93 large cities of the United States:		
Total deaths	9,434	9,448
Median for 3 prior years	9,322	
Total deaths, first 17 weeks of year	170,947	169,248
Deaths under 1 year of age	733	631
Median for 3 prior years	609	
Deaths under 1 year of age, first 17 weeks of year	13,548	10,341
Data from industrial insurance companies:		
Policies in force	67,304,515	67,208,187
Number of death claims	14,063	12,527
Death claims per 1,000 policies in force, annual rate	10.9	9.7
Death claims per 1,000 policies, first 17 weeks of year, annual rate	10.0	10.9

DEATHS DURING WEEK ENDED MAY 3, 1947

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended May 3, 1947	Corresponding week, 1946
Data for 93 large cities of the United States:		
Total deaths	8,977	8,974
Median for 3 prior years	8,922	
Total deaths, first 18 weeks of year	179,924	178,222
Deaths under 1 year of age	717	645
Median for 3 prior years	621	
Deaths under 1 year of age, first 18 weeks of year	14,295	10,986
Data from industrial insurance companies:		
Policies in force	67,280,612	67,214,474
Number of death claims	13,724	12,466
Death claims per 1,000 policies in force, annual rate	10.6	9.7
Death claims per 1,000 policies, first 18 weeks of year, annual rate	10.0	10.9

INCIDENCE OF DISEASE

No health department, State, or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED MAY 10, 1947

Summary

Of the total of 34 cases of poliomyelitis reported for the week, as compared with 25 last week, 56 for the corresponding week last year, and 32 for the 5-year (1942–46) median, 12 occurred in California (last week 5) and 3 each in Missouri and Texas. No other State reported more than 2 cases. A total of 855 cases has been reported to date this year, as compared with 729 last year and a 5-year (1942–46) median of 483 for the corresponding period. Since March 15 (the approximate average date of seasonal low incidence), 228 cases have been reported this year, as compared with 263 last year and a 5-year median of 181 for the same period. States reporting the largest numbers of cases since March 15 this year are as follows (corresponding last year's figures in parentheses): California 68 (32), New York 25 (31), Florida 12 (49), Texas 16 (35), Illinois 10 (8), Louisiana 10 (7), Michigan 8 (2), North Dakota 8 (1), and Missouri 7 (3).

A total of 2,298 cases of influenza was reported for the current week, as compared with 3,586 last week and a 5-year median of 1,072. The total for the year to date is 292,674 cases, of which 252,083 have been reported since March 1. For the corresponding periods last year the figures, respectively, are 183,596 and 23,246, and for the same periods of 1944 they were 330,757 and 24,243.

Slight net increases in the incidence of whooping cough were reported in all of the 9 geographic divisions of the country except the New England, South Atlantic and East South Central. The total of 3,914 cases reported for the week (last week 3,609, corresponding week last year 1,965, and 5-year median 2,576) is more than reported for any corresponding week since 1943 (4,133). The cumulative total for the year to date is 51,914, as compared with 35,000 for the same period last year, a 5-year median of 47,302, and 76,786 in 1943, the latter figure being the largest for a corresponding period of the past 5 years.

For the current week, 9,187 deaths were recorded in 93 large cities of the United States, as compared with 8,977 last week, 9,144 and 9,147, respectively, for the corresponding weeks of 1946 and 1945, and a 3-year (1944–46) median of 9,144. The total for the year to date is 189,111, as compared with 187,366 for the corresponding period last year.

Telegraphic morbidity reports from State health officers for the week ended May 10, 1947, and comparison with corresponding week of 1946 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46
	May 10, 1947	May 11, 1946		May 10, 1947	May 11, 1946		May 10, 1947	May 11, 1946		May 10, 1947	May 11, 1946	
NEW ENGLAND												
Maine	1	4	0	-------	1	-------	102	143	127	1	1	1
New Hampshire	0	0	0	-------	-------	-------	12	42	38	0	0	1
Vermont	0	1	1	7	2	-------	172	39	66	0	0	0
Massachusetts	13	8	4	-------	-------	-------	402	2,683	1,280	1	1	6
Rhode Island	1	1	1	-------	-------	1	173	35	52	0	1	1
Connecticut	1	2	0	8	1	1	1,072	411	411	3	2	3
MIDDLE ATLANTIC												
New York	16	18	15	[1] 1	[1] 5	[1] 5	636	4,265	1,555	5	13	24
New Jersey	8	11	4	2	4	4	461	4,170	1,192	1	5	6
Pennsylvania	16	13	10	([2])	[2] 1	[2] 1	284	3,414	1,329	4	12	12
EAST NORTH CENTRAL												
Ohio	12	17	10	2	3	5	918	999	497	2	5	12
Indiana	3	6	6	2	1	1	155	493	219	5	3	4
Illinois	4	8	8	4	9	11	228	792	695	4	7	14
Michigan [3]	10	5	3	2	-------	-------	116	1,027	902	1	5	5
Wisconsin	2	0	1	10	14	22	365	2,968	2,320	2	3	3
WEST NORTH CENTRAL												
Minnesota	3	7	3	-------	-------	-------	555	43	379	1	1	2
Iowa	0	2	2	70	-------	1	1,248	156	183	2	3	1
Missouri	5	1	4	5	1	1	70	126	226	3	3	7
North Dakota	3	2	1	21	2	2	85	16	17	0	0	1
South Dakota	0	5	1	-------	-------	-------	128	39	39	2	0	0
Nebraska	1	0	1	-------	-------	4	20	344	173	0	0	0
Kansas	4	6	4	1	-------	-------	17	320	465	0	0	1
SOUTH ATLANTIC												
Delaware	1	0	0	-------	-------	-------	2	22	13	0	0	0
Maryland [3]	6	8	6	10	4	4	41	682	423	3	3	5
District of Columbia	0	2	0	-------	1	1	8	338	123	2	5	3
Virginia	3	8	3	471	102	102	272	763	326	0	9	9
West Virginia	2	1	2	15	-------	8	48	302	159	1	1	1
North Carolina	8	8	6	-------	-------	4	155	537	537	1	0	2
South Carolina	3	4	4	384	205	103	130	439	127	1	0	1
Georgia	2	1	2	11	2	10	166	141	141	0	0	1
Florida	8	3	3	30	-------	1	54	201	201	2	1	2
EAST SOUTH CENTRAL												
Kentucky	3	11	3	3	-------	-------	20	157	113	1	4	4
Tennessee	1	0	1	48	12	27	37	279	154	4	2	9
Alabama	3	2	4	220	11	24	223	228	205	1	1	5
Mississippi [3]	3	7	7	9	-------	-------	13	-------	-------	1	3	3
WEST SOUTH CENTRAL												
Arkansas	4	3	2	39	29	23	91	123	123	1	1	2
Louisiana	2	0	4	22	7	2	23	190	88	1	0	2
Oklahoma	1	3	3	78	8	28	8	254	153	3	0	0
Texas	12	25	24	600	385	385	386	1,694	991	2	6	10
MOUNTAIN												
Montana	2	0	2	6	5	5	99	85	118	0	0	0
Idaho	0	1	0	3	3	-------	2	141	80	1	1	1
Wyoming	1	0	0	1	-------	1	14	38	93	0	0	0
Colorado	8	18	7	27	10	12	104	1,684	260	0	0	2
New Mexico	0	0	0	1	-------	1	19	67	27	1	0	0
Arizona	2	2	2	131	14	25	45	150	118	0	0	0
Utah [3]	2	0	0	6	-------	3	7	343	283	0	0	0
Nevada	0	0	0	-------	-------	-------	15	-------	-------	0	0	0
PACIFIC												
Washington	2	4	4	3	-------	-------	23	527	527	2	2	4
Oregon	3	1	0	18	4	8	-------	330	185	0	2	2
California	11	16	16	27	10	24	270	2,968	2,968	10	9	17
Total	191	245	187	2,298	856	1,072	9,495	35,208	25,813	75	115	178
19 weeks	5,012	6,670	5,255	292,674	183,596	73,372	116,715	454,338	368,642	1,671	3,286	4,345
Seasonal low week [4]	(27th) July 5–11			(30th) July 26–Aug. 1			(35th) Aug. 30–Sept. 5			(37th) Sept. 13–19		
Total since low	12,578	18,314	13,998	325,649	545,844	109,234	139,602	480,462	406,655	2,643	4,790	6,797

[1] New York City only.
[2] Philadelphia only.
[3] Period ended earlier than Saturday.
[4] Dates between which the approximate low week ends. The specific date will vary from year to year

Telegraphic morbidity reports from State health officers for the week ended May 10, 1947, and comparison with corresponding week of 1946 and 5-year median.—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended—		Median 1942–46	Week ended		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46
	May 10, 1947	May 11, 1946		May 10, 1947	May 11, 1946		May 10, 1947	May 11, 1946		May 10, 1947 [5]	May 11, 1946	
NEW ENGLAND												
Maine	0	0	0	3	14	14	0	0	0	0	1	1
New Hampshire	0	0	0	4	4	5	0	0	0	1	0	0
Vermont	0	0	0	9	12	12	0	0	0	2	0	0
Massachusetts	0	0	0	109	187	345	0	0	0	7	0	1
Rhode Island	0	0	0	9	20	17	0	0	0	0	0	0
Connecticut	0	0	0	34	69	69	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York	1	4	3	264	594	594	0	0	0	3	0	3
New Jersey	1	0	0	97	179	158	0	0	0	1	0	1
Pennsylvania	0	1	0	210	380	406	0	0	0	1	2	3
EAST NORTH CENTRAL												
Ohio	0	0	1	195	382	312	0	1	1	3	1	2
Indiana	1	0	0	116	56	66	1	0	0	1	2	2
Illinois	0	1	1	87	186	202	0	0	0	1	0	2
Michigan [3]	0	0	0	131	152	188	0	0	0	2	1	1
Wisconsin	0	1	1	65	122	221	1	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	2	0	0	52	60	60	0	0	0	0	0	0
Iowa	1	3	0	24	46	46	0	0	0	1	4	0
Missouri	3	1	0	41	33	62	2	0	0	0	4	2
North Dakota	1	1	0	4	5	5	0	0	0	0	0	0
South Dakota	0	0	0	4	11	11	0	0	0	0	0	0
Nebraska	1	0	0	27	12	26	0	0	0	0	0	0
Kansas	1	1	0	46	35	63	0	0	0	0	0	2
SOUTH ATLANTIC												
Delaware	0	0	0	13	4	7	0	0	0	0	0	0
Maryland [3]	0	0	0	30	200	180	0	0	0	1	0	0
District of Columbia	0	0	0	9	14	18	0	0	0	0	1	0
Virginia	[6] 0	0	0	28	72	66	0	0	0	4	0	1
West Virginia	0	0	0	12	35	35	0	0	0	1	2	1
North Carolina	0	0	0	20	27	27	0	0	0	2	0	1
South Carolina	0	1	1	3	5	5	1	0	0	3	2	2
Georgia	0	0	0	0	2	15	0	0	0	2	6	5
Florida	0	17	2	4	3	4	0	0	0	2	3	1
EAST SOUTH CENTRAL												
Kentucky	1	1	1	25	14	44	0	0	0	2	0	1
Tennessee	1	0	0	9	12	28	0	0	0	1	2	2
Alabama	0	2	1	9	19	8	0	0	0	1	3	1
Mississippi [3]	0	0	2	3	5	5	0	0	0	0	1	1
WEST SOUTH CENTRAL												
Arkansas	0	1	1	2	10	10	0	0	0	4	2	2
Louisiana	2	1	0	2	7	7	0	0	0	3	2	5
Oklahoma	1	0	0	2	10	15	0	0	0	0	0	1
Texas	3	16	2	25	47	58	0	2	1	7	11	11
MOUNTAIN												
Montana	0	0	0	3	4	16	0	0	0	1	0	0
Idaho	0	0	0	3	9	10	0	0	0	1	0	0
Wyoming	0	0	0	0	8	16	0	0	0	0	1	0
Colorado	0	2	0	32	55	56	0	1	0	1	2	1
New Mexico	0	0	0	11	4	10	2	0	0	0	3	1
Arizona	2	0	0	6	10	10	0	0	0	0	0	0
Utah [3]	0	0	0	7	21	21	0	0	0	0	0	0
Nevada	0	0	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	0	0	0	22	18	31	0	0	0	1	0	0
Oregon	0	0	0	10	42	36	0	0	0	4	1	0
California	12	2	2	136	142	166	0	0	0	5	2	3
Total	34	56	32	1,957	3,358	3,963	7	4	11	69	59	65
19 weeks	[6] 855	729	483	48,964	66,503	75,724	118	195	224	889	956	1,114
Seasonal low week [4]	(11th) Mar. 15–21			(32nd) Aug. 9–15			(35th) Aug. 30–Sept. 5			(11th) Mar. 15–21		
Total since low	[6] 228	263	181	75,650	105,074	114,045	172	271	341	404	481	498

[3] Period ended earlier than Saturday.
[4] Dates between which the approximate low week ends. The specific date will vary from year to year.
[5] Including paratyphoid fever reported separately, as follows: Massachusetts 7 (salmonella infection); Ohio 1; Michigan 1; Iowa 1; Virginia 1; North Carolina 2; South Carolina 1; Georgia 2; Florida 1; Texas 1; Colorado 1; Washington 1; California 4.
[6] Delayed report: Poliomyelitis, Virginia, 1 January case, included in cumulative total only.

Telegraphic morbidity reports from State health officers for the week ended May 10, 1947, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Whooping cough			Week ended May 10, 1947							
	Week ended—		Median 1942–46	Dysentery			Encephalitis, infectious	Rocky Mt. spotted fever	Tularemia	Typhus fever, endemic	Undulant fever
	May 10, 1947	May 11, 1946		Amebic	Bacillary	Unspecified					
NEW ENGLAND											
Maine	8	6	26								
New Hampshire	4		2								
Vermont	8	7	7								5
Massachusetts	117	137	151	1	1		1		1		2
Rhode Island	26	17	16								
Connecticut	32	40	48				2				11
MIDDLE ATLANTIC											
New York	249	161	166	5	1						1
New Jersey	149	181	135			1					1
Pennsylvania	172	116	209				1				1
EAST NORTH CENTRAL											
Ohio	195	73	82								2
Indiana	48	2	12						1		
Illinois	80	83	83	8	1				4		13
Michigan [3]	273	124	124								11
Wisconsin	192	84	84								5
WEST NORTH CENTRAL											
Minnesota	43	10	13								2
Iowa	27	33	18				1				8
Missouri	49	8	14			2		2			1
North Dakota			1								
South Dakota	1		2								
Nebraska	13		1								
Kansas	48	39	39							1	3
SOUTH ATLANTIC											
Delaware	5	5	1								
Maryland [3]	80	19	50			1		1			3
District of Columbia	8	8	8								
Virginia	97	110	65	1		93					2
West Virginia	27	51	16								
North Carolina	70	65	100	10	1						
South Carolina	86	44	57	3	17						3
Georgia	23	12	17						2	4	1
Florida	43	15	15	2						3	4
EAST SOUTH CENTRAL											
Kentucky	31	9	63		1				1		
Tennessee	35	8	29	2					2		1
Alabama	67	23	48							1	2
Mississippi [3]	10								2	2	2
WEST SOUTH CENTRAL											
Arkansas	55	11	9	1		3			1		
Louisiana	16	25	4	5					2	1	
Oklahoma	27	7	16						2		1
Texas	854	160	220	12	208	30				14	12
MOUNTAIN											
Montana	4	1	3								
Idaho	9	15	7					2			
Wyoming	3	4	5				1				
Colorado	41	56	37					2			5
New Mexico	66	16	14								
Arizona	44	32	28	1		64					
Utah [3]	15	19	32						2		2
Nevada			2								
PACIFIC											
Washington	25	28	28	5							
Oregon	12	17	21	1							1
California	427	84	265	6	3						7
Total	3,914	1,965	2,576	63	233	194	6	7	20	26	112
Same week, 1946	1,965			35	386	121	3	13	10	30	90
Median, 1942–46	2,576			32	374	84	9	13	18	50	[7] 97
19 weeks: 1947	51,914			891	5,536	3,813	127	28	590	716	1,980
1946	23,000			704	5,647	1,989	156	42	339	857	1,553
Median, 1942–46	47,302			560	4,426	1,304	156	42	316	857	[7] 1,598

[3] Period ended earlier than Saturday.
[7] 2-year average, 1945–46.
Anthrax: Pennsylvania 1 case.
Botulism: California 1 case.

WEEKLY REPORTS FROM CITIES [1]

City reports for week ended May 3, 1947

This table lists the reports from 90 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0	------	0	46	0	1	0	2	0	0	9
New Hampshire:												
Concord	0	0	------	0	------	0	0	0	1	0	0	------
Vermont:												
Barre	0	0	------	0	2	0	0	0	0	0	0	------
Massachusetts:												
Boston	6	0	------	0	51	0	11	0	20	0	2	26
Fall River	0	0	------	0	13	0	3	0	3	0	0	1
Springfield	0	0	------	0	26	0	0	0	1	0	0	1
Worcester	0	0	------	0	6	0	10	0	4	0	1	7
Rhode Island:												
Providence	0	0	------	0	139	0	4	0	7	0	0	14
Connecticut:												
Bridgeport	0	0	------	0	8	0	2	0	0	0	0	------
Hartford	1	0	------	0	66	0	0	0	1	0	0	------
New Haven	0	0	------	0	73	0	1	0	6	0	0	10
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0	------	0	------	0	5	0	9	0	0	2
New York	14	0	6	1	329	5	51	2	153	2	1	84
Rochester	0	0	------	0	4	0	3	0	7	0	2	2
Syracuse	0	0	------	0	------	0	1	0	9	0	0	25
New Jersey:												
Camden	6	0	------	0	------	0	1	0	4	0	0	4
Newark	0	0	1	0	34	0	3	0	10	0	0	26
Trenton	1	0	------	0	19	0	1	0	2	0	0	------
Pennsylvania:												
Philadelphia	5	0	------	0	21	3	19	0	47	0	1	44
Pittsburgh	1	0	2	2	22	2	6	0	30	0	0	17
Reading	0	0	------	0	2	0	2	0	1	0	0	3
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	0	0	------	1	------	0	3	0	6	0	0	4
Cleveland	0	0	------	0	191	1	4	1	35	0	0	47
Columbus	2	0	2	2	131	0	1	0	4	0	0	14
Indiana:												
Fort Wayne	0	0	------	0	14	0	2	0	3	0	0	3
Indianapolis	1	1	------	0	5	0	5	0	21	0	0	17
South Bend	0	0	------	0	19	0	0	0	3	0	0	------
Terre Haute	0	0	------	0	------	0	1	0	0	0	0	1
Illinois:												
Chicago	1	0	2	1	19	0	15	0	32	0	0	44
Springfield	1	0	------	0	52	0	2	0	0	0	0	------
Michigan:												
Detroit	1	1	1	1	6	0	15	0	47	0	1	105
Flint	0	0	------	0	------	0	1	0	2	0	0	------
Grand Rapids	1	0	------	0	3	0	1	0	4	0	0	9
Wisconsin:												
Kenosha	0	0	------	0	1	0	0	0	2	0	0	7
Milwaukee	0	0	------	0	53	0	5	0	15	0	0	27
Racine	0	0	1	1	------	0	0	0	9	0	0	4
Superior	0	0	------	0	------	0	0	0	0	0	0	------
WEST NORTH CENTRAL												
Minnesota												
Duluth	1	0	------	0	1	0	3	0	0	0	1	11
Minneapolis	4	0	------	0	8	0	9	0	18	0	0	5
St. Paul	0	0	------	0	437	0	3	0	10	0	0	12
Missouri:												
Kansas City	0	0	------	0	------	3	10	0	10	0	1	3
St. Joseph	0	0	------	0	------	0	0	0	1	0	0	4
St. Louis	1	0	1	1	22	2	6	0	6	0	0	15

[1] In some instances the figures include nonresident cases.

City reports for week ended May 3, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
WEST NORTH CENTRAL—continued												
Nebraska:												
Omaha	0	0		0		0	4	0	2	0	0	5
Kansas:												
Topeka	0	0		0	2	0	4	0	9	0	0	
Wichita	0	0		0	1	1	3	0	1	0	0	4
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0		0		0	0	0	2	0	0	1
Maryland:												
Baltimore	0	0	1	2	21	0	8	0	15	0	0	76
Cumberland	0	0		0		0	1	0	0	0	0	
Frederick	0	0		0		0	0	0	0	0	0	
District of Columbia:												
Washington	0	0		0	25	0	4	0	11	0	0	9
Virginia:												
Lynchburg	0	0		0	1	0	1	0	0	0	0	
Richmond	0	0		0	52	0	0	0	3	0	1	
Roanoke	0	0		0	31	0	0	0	1	0	0	
West Virginia:												
Charleston	0	0		0		0	0	0	0	0	0	
Wheeling	0	0		0	1	0	1	0	0	0	0	
North Carolina:												
Raleigh	0	0		0	2	0	1	0	0	0	0	2
Wilmington	0	0		0	2	0	0	0	0	0	0	
Winston-Salem	0	0		0	25	0	0	0	2	0	0	
South Carolina:												
Charleston	0	0	12	0		0	2	0	0	0	0	1
Georgia:												
Atlanta	1	0		0	29	0	10	0	0	0	0	2
Brunswick	0	0		0	3	0	0	0	0	0	0	
Savannah	0	0	6	0	6	0	4	0	0	0	0	
Florida:												
Tampa	1	0		0	4	0	4	0	0	0	0	5
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	1	0	3	0	6	0	7	0	1	0	0	10
Nashville	0	0		0	1	0	2	0	1	0	0	6
Alabama:												
Birmingham	0	0	9	0	40	2	4	0	0	0	0	1
Mobile	0	0		0	14	0	0	0	0	0	0	13
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0		2	2	0	1	0	0	0	0	9
Louisiana:												
New Orleans	1	0	10	0	45	2	5	2	3	0	0	6
Shreveport	0	0		0		0	2	0	0	0	0	
Oklahoma:												
Oklahoma City	0	0	4	0		0	3	0	0	0	0	2
Texas:												
Dallas	0	0	1	1		0	2	0	3	0	0	7
Galveston	0	0		0		0	1	0	0	0	0	
Houston	1	0	2	1	4	1	5	0	2	0	1	4
San Antonio	1	0		1	6	0	3	0	0	0	0	1
MOUNTAIN												
Montana:												
Billings	0	0		0	1	0	0	0	0	0	0	
Great Falls	0	0		0	25	0	2	0	0	0	0	
Helena	0	0		0		0	0	0	0	0	0	
Missoula	0	0	10	0	40	0	0	0	0	0	0	
Idaho:												
Boise	0	0		0		0	1	0	1	0	0	
Colorado:												
Denver	3	0	1	0	32	0	4	0	10	0	0	6
Pueblo	0	0		0		0	1	0	2	0	0	3
Utah:												
Salt Lake City	2	0		0	4	0	3	0	7	0	0	4

City reports for week ended May 3, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
PACIFIC												
Washington:												
Seattle	0	0	3	2	------	2	1	0	8	0	0	6
Spokane	0	0	------	0	26	0	1	0	0	0	0	1
Tacoma	0	0	------	0	2	0	0	0	0	0	0	3
California:												
Los Angeles	2	0	2	0	6	1	5	3	38	0	0	36
Sacramento	0	0	------	0	1	0	1	0	0	0	1	6
San Francisco	0	0	------	0	8	0	4	0	8	0	1	1
Total	60	2	80	19	2,201	25	315	8	675	2	14	837
Corresponding week, 1946*	68	------	57	15	11,384	------	203	------	946	2	12	462
Average, 1942-46*	64	------	56	[2] 17	[3] 6,312	------	[2] 330	------	1,523	1	14	774

[2] 3-year average, 1944-46.
[3] 5-year median, 1942-46.
* Exclusive of Oklahoma City.

Anthrax.—Cases: Philadelphia 1.
Dysentery, amebic.—Cases: Boston 1; New York 4; New Orleans 6; Los Angeles 1.
Dysentery, bacillary.—Cases: Los Angeles 1.
Dysentery, unspecified.—Cases: San Antonio 4.
Leprosy.—Cases: Galveston 1.
Tularemia.—Cases: New Orleans 1.
Typhus fever, endemic.—Cases: Tampa 1; Mobile 1; New Orleans 1.

Rates (annual basis) per 100,000 population, by geographic groups, for the 90 cities in the preceding table (latest available estimated population, 34,602,700)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza Case rates	Influenza Death rates	Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
New England	18.3	0.0	0.0	0.0	1,124	0.0	83.6	0.0	118	0.0	7.8	178
Middle Atlantic	12.5	0.0	4.2	1.4	190	4.6	42.6	0.9	126	0.9	1.9	96
East North Central	4.3	1.2	3.6	3.6	300	0.6	33.4	0.6	111	0.0	0.6	171
West North Central	12.1	0.0	2.0	2.0	947	12.1	84.5	0.0	115	0.0	4.0	119
South Atlantic	3.3	0.0	31.1	3.3	330	0.0	58.8	0.0	56	0.0	1.6	157
East South Central	5.9	0.0	70.8	0.0	300	11.8	70.7	0.0	12	0.0	0.0	177
West South Central	7.6	0.0	43.2	12.7	145	7.6	55.9	5.1	20	0.0	2.5	74
Mountain	39.7	0.0	87.4	0.0	810	0.0	87.4	0.0	159	0.0	0.0	103
Pacific	3.2	0.0	7.9	3.2	68	4.7	19.0	4.7	85	0.0	3.2	84
Total	9.1	0.3	12.1	2.9	346	3.8	47.6	1.2	102	0.3	2.1	126

PLAGUE INFECTION IN KITTITAS AND YAKIMA COUNTIES, WASH.

Plague infection was reported proved, on May 5, in a pool of 60 fleas from 108 meadow mice, *Microtus* sp., and a pool of 45 fleas from field mice, *Peromyscus* sp., all collected on April 25 at a location on the top of Umatanum Ridge on the Yakima-Kittatas county line, Washington.

TERRITORIES AND POSSESSIONS

Panama Canal Zone

Notifiable diseases—March 1947.—During the month of March 1947, certain notifiable diseases were reported in the Panama Canal Zone and terminal cities as follows:

Disease	Residence[1]									
	Panama City		Colon		Canal Zone		Outside the Zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox	28		2		4		7		41	
Diphtheria	9	1							9	1
Dysentery:										
Amebic	1		1		1		4		7	
Bacillary	4				2				6	
Encephalitis, lethargic					1				1	
Leprosy						1				1
Malaria[2]	7		7		12		33	2	59	2
Measles	8	1			4		2		14	1
Meningitis, meningococcus			2				1		3	
Mumps					1				1	
Pneumonia		11		1	16			5	[3] 16	17
Tuberculosis		11		10	1	2		12	[3] 1	35
Typhus fever (murine)	2						11		13	

[1] If place of infection is known, cases are so listed instead of by residence.
[2] 8 recurrent cases.
[3] In the Canal Zone only.

Virgin Islands of the United States

Notifiable diseases—January–March 1947.—During the months of January, February, and March 1947, cases of certain notifiable diseases were reported in the Virgin Islands of the United States as follows:

Disease	January	February	March
Filariasis		2	
Gonorrhea	19	7	15
Hookworm disease	3	1	3
Leprosy		1	
Lymphogranuloma inguinale	1		
Mumps			1
Pellagra		2	
Poliomyelitis			1
Syphilis	23	9	22
Tuberculosis, pulmonary			1
Whooping cough			2

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended April 19, 1947.—During the week ended April 19, 1947, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		45		216	320	17	11	60	90	768
Diphtheria		3		31	1	6	1		1	43
Dysentery:										
Amebic					3					3
Bacillary				3					1	4
Encephalitis, infectious					1					1
German measles		1		26	49		11	4	5	96
Influenza		17			6	6			70	99
Measles		52	1	72	162	216	65	108	428	1,134
Meningitis, meningococcus									1	1
Mumps		22		41	516	51	107	12	209	958
Poliomyelitis			1	1			1		1	4
Scarlet fever		3	1	53	76	7	2	2	8	152
Tuberculosis (all forms)		9	8	118	20	18	13	26	36	278
Typhoid and paratyphoid fever				15					2	17
Undulant fever				3	5			1	1	10
Venereal diseases:										
Gonorrhea	5	12	25	107	102	26	36	45	66	424
Syphilis	2	10	14	83	65	7	3	16	44	250
Other forms				1					7	8
Whooping cough		19		20	77	31		9	32	191

NORWAY

Notifiable diseases—January 1947.—During the month of January 1947, cases of certain notifiable diseases were reported in Norway as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	20	Paratyphoid fever	7
Diphtheria	200	Pneumonia (all forms)	3,403
Dysentery, unspecified	2	Poliomyelitis	9
Encephalitis, epidemic	1	Rheumatic fever	201
Erysipelas	482	Scabies	4,804
Gastroenteritis	2,026	Scarlet fever	867
Gonorrhea	852	Syphilis	164
Hepatitis, epidemic	314	Tuberculosis (all forms)	415
Impetigo contagiosa	3,969	Typhoid fever	15
Influenza	5,335	Undulant fever	3
Lymphogranuloma inguinale	3	Weil's disease	2
Measles	92	Whooping cough	1,914
Mumps	535		

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From consular reports, international health organizations, medical officers of the Public Health Service, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

[C indicates cases]

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place		January-February 1947	March 1947	April 1947—week ended—			
				5	12	19	26
ASIA							
Burma	C	80	13	2	3	5	
Moulmein	C	2	10	2	3	1	
India	C	5,988	8,860				
Calcutta	C	[1] 341	[1] 474	147	433	468	
Cawnpore	C		6		2		
Chittagong	C		[2] 1				[2] 1
Lucknow	C		2	1			
Madras	C	2					
India (French)	C	37	3				
Indochina (French):							
Cambodia	C	230					
Cochinchina	C	64	57	6	3	9	7
Cholon	C		11			2	
Giadinh	C	11					
Longxuyen	C	6					
Rachgia	C	9	2			4	
Saigon	C	34	44	6	3	3	7
Vinh-long	C	4					
Siam (Thailand)	C	991	531				
Bangkok	C	246	92	44	71	61	

[1] Includes imported cases.
[2] Imported.

PLAGUE

[C indicates cases]

Place		January-February 1947	March 1947	April 5	April 12	April 19	April 26
AFRICA							
Belgian Congo	C		[1] 4	1	1	1	1
British East Africa:							
Kenya	C	6	6		2		
Uganda	C		1				
Egypt: Alexandria.[2]							
Madagascar	C	115	24				
Union of South Africa	C	9	10				
ASIA							
Burma	C	812	312	18	4	3	
Bassein	C	[3] 1	[3] 1				
Mandalay	C	15	2				
Rangoon	C	2	6	1	1	1	
China:							
Chekiang Province	C	9					
Fukien Province	C	35			[4] 3		
Amoy	C				[4] 3		
Kiangsi Province	C	6	[5] 7			12	2
Nanchang	C		[5] 7			12	
Kiangsu Province: Shanghai	C	28					
Yunnan Province	C	16					
India	C	10,161	30,970				
Indochina (French):							
Annam	C	3					
Cochinchina	C	2	1				
Java	C	[6] 26	7	2	1		
Palestine	C	1					
Siam (Thailand)	C	13	18				
Syria	C				6		
Turkey: Akcakale	C		5	1	10	2	

[1] Pneumonic.
[2] For the week ended May 3, 1 case of plague was reported in Alexandria, Egypt.
[3] Imported.
[4] For the period Apr. 1-10, 1947.
[5] Including 5 suspected cases.
[6] Includes 2 imported cases in Batavia.

PLAGUE—Continued

Place		January–February 1947	March 1947	April 1947—week ended— 5	12	19	26
EUROPE							
Portugal: Azores	C	1					
Turkey (see Turkey in Asia).							
SOUTH AMERICA							
Argentina: Santa Fe Province	C	2					
Ecuador:							
Chimborazo Province	C	1	1				
Loja Province	C		2				
Peru:							
Libertad Department	C	6	2				
Lima Department	C	12					
Piura Department	C	48	10				
OCEANIA							
Hawaii Territory: Plague infected rats [7]			1				

[7] Plague infection was also reported in Hawaii Territory as follows: On Jan. 9, 1947, in a pool of 31 rats; on Mar. 20, 1947, in a pool of fleas.

SMALLPOX

[C indicates cases; P, present]

Place		January–February 1947	March 1947	April 1947—week ended— 5	12	19	26
AFRICA							
Algeria	C	85					
Basutoland	C		1				
Bechuanaland	C	14					
Belgian Congo	C	[1] 201	105	47	158	24	
British East Africa:							
Kenya	C	80	75	11	13		
Nyasaland	C	232	112	37	33	4	5
Tanganyika	C	307	314				
Uganda	C	65	34	5			
Cameroon (French)	C	7	1				
Dahomey	C	29	1			[2] 18	
Egypt	C	79	54	2			
Ethiopia	C		17				
French Equatorial Africa	C	3					
French Guinea	C	70	52				
Gambia	C			1	3		
Gold Coast	C	364	96	4	9		
Ivory Coast	C	437	181				
Liberia	C	23	12				
Libya	C	509	517		61	91	107
Mauritania	C	22					
Morocco (French)	C	37	6		[3] 1		
Morocco (Int. Zone)	C	2	2				
Morocco (Spanish)	C	14					
Nigeria	C	1,271	839				
Niger Territory	C	440	545				
Portuguese Guinea	C	3					
Rhodesia:							
Northern	C	4	2				
Southern	C	[4] 2	2	2			
Senegal	C	6	4				
Sierra Leone	C	80	31				
Sudan (Anglo-Egyptian)	C	[1] 16	10				[1] 27
Sudan (French)	C	156	83				
Swaziland	C	10					
Togo (French)	C	59	18				
Tunisia	C	372	69				
Union of South Africa	C	65	P	P	P	P	P

See footnotes at end of table.

SMALLPOX—Continued

Place		January-February 1947	March 1947	April 1947—week ended— 5	12	19	26
ASIA							
Burma	C	685	954	164	76	90	
Ceylon	C	1					
China	C	731	474			[5] 154	
India	C	7,304	9,524				
India (French)	C		8				
India (Portuguese)	C	1	2				
Indochina (French)	C	531	313				[6] 112
Iran	C	6	1		1	1	
Iraq	C	1	5				
Japan	C	116	67	4			
Malay States (Federated)	C	1,040	534	114		117	
Manchuria	C	4					
Siam (Thailand)	C	398	244				
Straits Settlements	C	78	13	1	1		2
Syria	C		1			1	
Turkey (see Turkey in Europe).							
EUROPE							
Belgium	C					[1] 16	
France	C	12	19				
Germany	C	5	6				
Great Britain: England and Wales [7]	C	15	11	1	6		
Italy	C	20					
Portugal	C	6	1				
Spain	C	13	3				
Turkey	C	1	1				
NORTH AMERICA							
Guatemala	C	3					
Mexico	C	48					
SOUTH AMERICA							
Argentina	C	2					
Brazil	C	[1] 18	[1] 3				
Colombia	C	340	225				
Ecuador	C	34	15				
Paraguay	C	[1] 82					
Peru	C	55					
Uruguay	C	[1] 149					
Venezuela	C	[1] 206	[1] 117				

[1] Includes alastrim.
[2] For the period Apr. 11-20, 1947.
[3] For the period Apr. 1-10, 1947.
[4] Includes 1 imported case.
[5] For the period Apr. 1-20, 1947.
[6] For the 4 weeks ended Apr. 26, 1947.
[7] For the week ended May 3, 1947, 1 fatal case of smallpox was reported in Bilston, England.

TYPHUS FEVER*

[C indicates cases; P, present]

Place		January-February 1947	March 1947	April 1947—week ended— 5	12	19	26
AFRICA							
Algeria	C	113					
Basutoland	C	3					
Belgian Congo	C	80	69	5	16	8	
British East Africa:							
Kenya	C	2	1				
Uganda	C	1					
Egypt	C	23	14	4	1	3	2
Eritrea	C	168	98	42	12	12	
Ethiopia	C		31				
French West Africa [1]	C	1					
Gold Coast	C		2				
Libya	C	26	39		2	4	5
Morocco (French)	C	61	19		2		
Morocco (Spanish)	C	11					
Nigeria	C	2	1				
Tunisia	C	116	43				
Union of South Africa [2]	C	41	P	P	P	P	P

*Reports from some areas are probably murine type, while others probably include both murine and louse-borne types.

[1] Murine type.
[2] Includes cases of murine type.

TYPHUS FEVER—Continued

Place		January–February 1947	March 1947	April 1947—week ended— 5	12	19	26
ASIA							
Burma	C	2	1				
China [2]	C	18	5	1	3	1	
India	C	5					
Iran	C	14	17				
Iraq	C	24	32	6	4	14	8
Japan	C	305	105	19			
Java	C	1					
Malay States (Federated)	C	7					
Palestine [2]	C	14				11	
Straits Settlements	C	1					
Syria	C	4	4	4	5		
Trans-Jordan	C	1	4			3	
Turkey (see Turkey in Europe).							
EUROPE							
Austria	C	1					
Bulgaria	C	258	111				
Czechoslovakia	C	3	3	2			
France	C	3					
Germany	C	4	2				
Great Britain: Malta and Gozo [1]	C	3		1			
Greece [2]	C	48	17	7	3	8	4
Hungary	C	169	137	23	21	38	
Italy	C	2					
Sicily	C	1					
Netherlands	C	1					
Poland	C	134	53				
Portugal	C	1				1	
Rumania	C	3,212	3,378				
Spain	C	10	15				
Switzerland [1]	C	1					
Turkey	C	207	90	11	16	12	6
NORTH AMERICA							
Costa Rica [1]	C	21	10		6		
Cuba [1]	C	2					
Guatemala	C	112					
Jamaica [1]	C	2	6			1	
Mexico	C	531					
Panama Canal Zone	C	2	2				
Panama (Republic)	C	[3] 12					
Puerto Rico [1]	C	7					
SOUTH AMERICA							
Argentina	C	4	2				
Chile [2]	C	82					
Colombia	C	265	159				
Ecuador [2]	C	112	40				
Peru	C	156					
Venezuela [2]	C	10	6				
OCEANIA							
Australia [1]	C	19	12		8		
Hawaii Territory [1]	C	9					

[1] Murine type.
[2] Includes cases of murine type.
[3] Includes imported cases.

YELLOW FEVER

[C indicates cases; D, deaths]

Place		January–February 1947	March 1947	April 1947—week ended— 5	12	19	26
SOUTH AMERICA							
Columbia:							
Antioquia Department	C		3				
Caldas Department	D	1					
Cundinamarca Department	D	2					
Santander Department	D	20	2				
Tolima Department	D	2					

X

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the United States Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

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EDITORIAL

THE TIME ELEMENT IN TUBERCULOSIS CONTROL

It has been emphasized in recent years that the most effective method of controlling tuberculosis is by means of chest X-ray examinations of the adult population in a definite period of time. In an attempt to achieve this objective, the United States Public Health Service is assisting State and local health departments with equipment, personnel, and consultation. Indeed, through demonstration of the effectiveness of community-wide mass X-ray surveys, the people of the nation now realize the seriousness of the tuberculosis problem in their communities and are initiating action to stamp out the disease.

The action prompted by this new technique has often been interrupted by confusion of public-health principles, a condition occasioned by varying approaches to tuberculosis control.

One group believes that the single technique of examining contacts of known cases will discover all the new cases in the community. Another group advocates an annual tuberculin test of every person as the sole means of discovering all cases of tuberculosis. A third group, mostly epidemiologists, emphasizes the damage done by hidden cases of tuberculosis and by their many unknown contacts, and urges a total assault on the disease by means of (1) community-wide X-ray surveys done within a deliberately limited period of time; (2) the concurrent establishment of adequate follow-up facilities and the examination of contacts of previously known and newly discovered cases; and (3) tuberculin testing of samples of the population at stated intervals.

Family studies and careful follow-up work in some of the best health

This is the sixteenth of a series of special issues of PUBLIC HEALTH REPORTS devoted exclusively to tuberculosis control, which will appear the first week of each month. The series began with the Mar. 1, 1946 issue. The articles in these special issues are reprinted as extracts from the PUBLIC HEALTH REPORTS. Effective with the July 5, 1946 issue, these extracts may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., for 10 cents a single copy. Subscriptions are obtainable at $1.00 per year; $1.25 foreign.

departments in the country have shown that examination of contacts discovers only about 25 percent of new cases reported each year. In other words, only one out of four new cases is found by examining contacts of previously known cases. Three out of four are new cases from the apparently healthy population, about whom there has been no previous record. Moreover, the principle of examining the adult population in a limited time, which is so important in the control of tuberculosis, cannot be effectively applied in a program which examines the contacts of known cases only. Too large a portion of the population is not reached at all. Unless contact examination is reinforced by other case-finding services, intense and continuous exposure of the public to hidden cases will occur. In addition, this method, if used alone, is prodigal of time, personnel, and money and can at best be only partially effective.

Annual tuberculin testing of the entire population of the United States, accompanied by X-ray examination of reactors, has been shown to be impracticable. Particularly, in large cities the major proportion of the adults are reactors to tuberculin and little is gained by tuberculin testing before X-ray examination. Tuberculin testing of sample groups of the community at intervals is extremely useful in determining changes in the infection rate from year to year. After the spreaders of the disease have been identified, treated and isolated, and contacts supervised, it might be desirable to test those whole communities where the infection rate is low. The tuberculin test, moreover, is a most efficient tool in helping to establish the diagnosis of tuberculosis after the X-ray examination.

The Tuberculosis Control Division has a limited number of demonstration units for assisting selected cities, especially those of 100,000 population and over, in surveying the majority of adults in the population, and by such means it can show that even the larger population groups in the country can be surveyed in less than 3 years. In cities under 100,000 less than 3 months is required.

The Division is prepared to provide, within the limits of its resources, expert consultation, loan of personnel and equipment to districts, States, and local communities. X-ray film of all sizes, radiology service, public health nursing, medical social work, and health education, are further aids which the Public Health Service can provide temporarily if the local health department has inadequate resources. Tuberculosis associations can give expert guidance and material support in health education, which communities must use if a successful program is to be realized. Participation of the local medical societies in diagnosis, treatment, and medical supervision constitute an additional source of aid to the community. By such means, every community can develop time-plans for tuberculosis control.

With full use of resources heretofore unrealized and with a resolute determination to wipe out tuberculosis as a social and personal problem, the large and small communities of the entire United States could be covered by mass radiography teams in less than 5 years' time. This modern method, combined with efficient clinical and laboratory procedures for exact diagnosis, will give communities a precise knowledge of the local tuberculosis problem and will form the basis for realistic plans to remove the danger of tuberculous infection and disease. Adequately aided by money, trained personnel, laboratory, and other medical facilities, every aroused community can bring about the defeat of tuberculosis among its citizens.

HERMAN E. HILLEBOE,
Assistant Surgeon General,
Associate Chief, Bureau of State Services.

THE CONTROL OF TUBERCULOSIS IN THE AMERICAS

By THOMAS PARRAN, *Surgeon General, United States Public Health Service*

With every year our social and cultural horizon includes an expanding sphere of awareness and activity. In the field of health we have come a long way. Not many years ago, health was a matter of individual concern; but as the world became smaller, men more mobile, cities larger, and nations more closely connected, health slowly but surely became the concern of the whole community of mankind. Not only the shrinking and hastening world, but war and its devastations emphasize the universal scope of health problems. Now, in this place and time, we face the consequences of destruction. Moral failure, economic collapse, and political confusion contribute to our frustrations when we attempt to deal with the public health of our day In the long run, we must perceive that little can be done until cooperation supersedes individualism, and unity world unity becomes our final spirit of approach.

In the terrible years just passed, the deaths of young men, the devastation of homes, the destruction of those things held to be good and desirable, have been sacrifices to decency and the fine dream of freedom. Yet disease is the final victor. Epidemics arrive, the starving die, the hearty fall. Malnutrition, exposure, and lack of sanitation provide the physical soil; as terror, despair, and sickness of heart compose the spiritual territory for the flourishing of disease.

Among the diseases that are now epidemic in war stricken areas, tuberculosis, which in days of peace had very nearly come under effec-

[1] A paper presented to the XII Pan American Sanitary Conference, Caracas, Venezuela, January 20, 1947.

tive control, has become again a fearful problem. Yet happily we know that tuberculosis can be, even under unfavorable circumstances, controlled and eventually eliminated. Experiences of the United States and the Scandinavian countries point the way and leave no doubt that the concentrated effort of many men and agencies in case finding, medical care and isolation, in chemotherapy and, perhaps, vaccination, can defeat a disease that takes a greater toll of lives than does the most disastrous war.

It is commonplace to observe that disease is not hampered by geographic or ethnologic barriers. Given the speed and ease of travel, the frequent movement and congress of peoples throughout the world, it is unlikely that tuberculosis can be controlled in one country if it is epidemic in another. It is in the self-interest of relatively healthy and well-fed nations to prevent the supremacy of tuberculosis in any area. But such action has a more important motive than mere self-interest, for deeply engrained in the culture of the western world is the common sympathy that man has for man, without which democracy is meaningless and ethical principles absurd.

The United States has been more fortunate than many other nations. War did not touch its soil; bombs did not reach its cities. Indeed, through the war years, the mortality rate of tuberculosis continued to decline. We cannot, however, assume that such happy circumstance is the consequence wholly of our fortunate situation. As recently as 1890 the tuberculosis death rate in the United States was 245 per 100,000 population. This is comparable to the present estimated death rate of Venezuela, which is 233 per 100,000 and that of Brazil which is 250.

From 1882, when Koch announced his discovery of the tubercle bacillus, to the year 1892, when Flick organized the Pennsylvania Society for the Prevention of Tuberculosis, there was in the United States a struggle, which must be encountered everywhere at the beginning of a control program, to establish the concept of the contagiousness of tuberculosis, as against the old and still widely accepted idea of the hereditary transmission of "consumption."

As control programs gained in force in the United States and when, by 1904, the National Tuberculosis Association was organized and the whole movement given unity of action and purpose, the death rate from tuberculosis began to decline. To be sure, many other factors, most of them inscrutable, contributed to this decline in the tuberculosis death rate. However, it must be said that the largest measure of credit should go to organized control programs.

In 1904 there were only 6 tuberculosis control programs in the United States and only 100 tuberculosis sanatoria and hospitals. In this year the tuberculosis death rate was 200 per 100,000 population.

Only 10,000 beds were available. There were no dependable means for the early diagnosis of the disease. When tuberculosis was discovered, it was far advanced and death soon followed. Little was done to isolate the tuberculous, and people by the thousands were brought in close contact with virulent organisms. Every year tuberculosis claimed the lives of thousands of children. Young men and women, who had arrived at that period of life when one is most productive, faced certain death when a diagnosis of tuberculosis was made. Because little was done to slaughter tuberculous cattle, bovine tuberculosis attacked our citizens, and extrapulmonary tuberculosis was widespread.

Between the years 1905 and 1935, the public health and clinical aspects of tuberculosis control underwent gradual but confident development. Methods of diagnosis, treatment, surgery, and health education were refined in technique, extended in application, and improved in quality. Epidemiological studies and surveys were instituted and completed; research projects were undertaken and significant advances were made.

It was in the decade between 1936 and 1946 that all control methods came to their highest peak of development. Mass radiography, with the development of the photofluorograph and the automatic phototimer; experiments in chemotherapy and antibiotics; greatly expanded research in epidemiology; health education; the development of an official national control program; and the expansion of control methods in industry, general hospitals, and the armed forces, marshalled the power of science and shaped the knowledge and understanding of men in the fight against tuberculosis. In spite of the rigors of wartime, the death rate from tuberculosis in the United States in 1945 was down to 40.1 per 100,000 population.

Until the year 1944, tuberculosis control was the job of private voluntary agencies, and the extraordinary achievements of tuberculosis control in my country is, in large measure, the result of vigorous efforts of the National Tuberculosis Association. However, it became apparent as early as World War I that official agencies were needed to guide, complement, and to cooperate in control activities. In 1919 the National Tuberculosis Association adopted a resolution urging the establishment of a division of tuberculosis control in the United States Public Health Service. It was not possible to create such a division at that time, but with the advent of World War II the National Tuberculosis Association appointed a War Emergency Committee to consider what should be done to bring about more unity in the campaign against tuberculosis. The United States Public Health Service at this time became actively engaged in this field, and soon after Pearl Harbor the Public Health Service established a small Tuberculosis Control Section in one of its Divisions. Throughout 1943 and

early 1944 the agitation continued, and, as a result of concerted effort, a comprehensive bill was introduced to Congress. That legislative body acted affirmatively, and on July 1, 1944, the Tuberculosis Control Division of the United States Public Health Service was established.

Since the inception of the Tuberculosis Control Division, the United States Public Health Service has gone forward, and has made many advances toward a realization of the objective of all agencies in this field—the eradication of tuberculosis in the United States. From the beginning we have had four major objectives in the fight against tuberculosis: (1) case finding; (2) medical care and isolation; (3) after care and rehabilitation; and (4) protection of the tuberculous patient and his family against economic distress. These objectives have been guiding principles which have produced useful findings and have created policies and procedures for the future.

In case finding, the miniature film X-ray machine has been the major tool. It permits the examination of large population groups. Before this instrument was brought to its present state of refined development, only individuals and families could be easily reached by standard X-ray equipment. Now the X-ray goes to the people, examines them in large groups, and discovers tuberculosis, mostly, in its minimal stage. The importance of this finding is made clear by the fact that in former years only 10 percent of admissions to tuberculosis hospitals were minimal cases. Today, with modern case finding techniques, 70 percent of all new cases found are minimal. Tuberculosis is at last being found when it can be relatively easily arrested.

When it began operation, the Division put special emphasis on case finding. The purpose of case finding is to discover hidden cases of tuberculosis. Such effort, in the past, was directed toward the family members of known infectious cases. Since the introduction of mass radiography, case finding has had a much greater range. It has been aimed at large population groups. The two sizeable portions of the population which can be quickly reached by mass radiography are persons admitted to general hospitals and persons employed in the industries of the nation. This second group, at the beginning of nation-wide activities, was one of the chief interests of the Tuberculosis Control Division.

It is estimated that by the end of 1946 more than 25 million persons in the United States, 16 years of age and older, will have had chest X-ray examinations through the resources of the armed forces, health departments, industry, and voluntary tuberculosis associations.

Industrial workers as a group will continue to loom large in future mass radiography plans; however, a program is already under way, through the cooperative efforts of the American Hospital Association, the National Tuberculosis Association, and the Public Health Service,

to have all general hospitals participate in case-finding projects. Such undertaking will provide for the routine X-ray examination of all patients and employees coming to general hospitals, and their out-patient departments.

Probably the most important single phase in tuberculosis control is medical care and isolation of persons with active infectious disease. Public Health principles dictate a primary interest in prevention of the spread of the disease. The desired results of case finding cannot be realized if treatment is delayed by inadequate sanatorium care. In America we are faced with the problem of providing at least 50,000 additional sanatorium beds. At present, long periods of hospitalization are necessary for the care and treatment of advanced tuberculous patients. However, as mass radiography reaches larger numbers of the population, shorter periods of care will frequently be the rule, since many of the patients will have early disease. If sufficient clinical facilities are established throughout the country, such persons, including those on ambulatory collapse therapy, may be regularly transferred to the chest clinic for treatment and supervision. Others need only enter convalescent homes for the period of transition.

Rehabilitation and aftercare are also important objectives in the frontal attack on tuberculosis. It is well known that tuberculosis is a relapsing and debilitating disease. In his readjustment to self-supporting life, the patient whose disease has become arrested must have competent medical, social, and financial guidance. This is a complex problem which requires the help of many private and public agencies interested in tuberculosis control.

Reports from the American Medical Association show that the cost of sanatorium care of the tuberculous in the United States is close to $100,000,000 each year; but this does not even closely approximate the social and economic losses sustained by tuberculous persons and their families in the same period.

When a patient leaves the sanatorium it is often necessary, because of his invalidism, to protect this person for several years after discharge. Sooner or later it will be necessary to follow the example of such countries as Denmark, and provide invalidism insurance for these unfortunate people during the period of their disability. With the knowledge gained from the social and economic studies of tuberculous families, data will be provided to make possible certain changes in our social security laws that will bring economic relief to our tuberculous families.

The protection of the tuberculous family against economic distress is a special problem in itself. Tuberculosis is a community disease which is important not only in terms of public health but also in terms

of national economy. Once the disease becomes far advanced, the affected person is usually disabled for life, or dies a premature and costly death. The family, broken by a long period of illness or by the death of the breadwinner, is almost invariably thrown on public resources for support. Accordingly, a sound medical program must be complemented by a generous plan of public assistance, particularly for the needy families of the tuberculous. If this is not done, the full benefits of other control activities, especially sanatorium care, cannot be realized. It must be remembered that tuberculosis and poverty are frequently associated. A national plan to provide adequate insurance for the family against loss of wages during the period of prolonged sickness is the only realistic answer to this problem.

In the field of antibiotics repeated and persistent efforts have been made to find a drug that would be effective in the cure of tuberculosis. Men of science in almost every nation of the world have worked through lifetimes to find a lethal agent to defeat a germ that has consistently resisted every attempt against its predatory existence. Over the years, the hopes of the ill have been lifted by such attempts at treatment as tuberculin injections, gold therapy, the application of sulpha drugs, and various vaccines. In every instance the high hopes were dashed by failure. Although investigations continued, few drug cures for tuberculosis were offered until very recently when Waksman isolated a promising compound (streptomycin) from certain species of the soil actinomycetes. Streptomycin has forged ahead, and in laboratory and animal trials, has become the current drug of promise. At the moment streptomycin is being tried on human beings; and, although no extensive controlled experiments have been performed, preliminary results not only give hope of suppressive action, even in meningitis and miliary tuberculosis, but also point the way to further investigation and search for similar antibiotics that may be even safer and more economical.

BCG vaccination on a large scale has not been the practice in the United States as it has been in South America and in Europe. Only in recent years has there been any organized effort to consider the use of BCG in my country. The successful use of this vaccine in South America and in Denmark and controlled studies among American Indians by the Office of Indian Affairs, Department of the Interior, and by the United States Public Health Service, directed the attention of researchers in the field of tuberculosis to BCG vaccine and its possible application in population groups where infection is high and hospital facilities poor. As a consequence of these studies, it was determined that the United States Public Health Service would be responsible for long-range control studies of BCG vaccination. It was determined that a central laboratory be established to produce

the vaccine, and that a large city be utilized for control studies. Within the next few years the United States Public Health Service will be in a position to make recommendations for the use of the vaccine. We feel that further research is necessary in the United States to determine the effectiveness of vaccination and also to develop a vaccine composed of dead bacilli.

We feel that one of the most interesting and significant researches that has been undertaken in the field of tuberculosis for many years is the work in nontuberculous pulmonary calcification, particularly the researches into the occurrence of histoplasmosis. Our studies demonstrated that a mild, subclinical condition, associated with sensitivity to histoplasmin, is widely prevalent in certain States and relatively infrequent in others. In general, those States in which the frequency of reaction to histoplasmin is high are those in which pulmonary calcification is also high. A very high proportion of the pulmonary calcifications observed in roentgenograms of tuberculin-negative persons is due not to tuberculosis, but probably to the agent producing histoplasmin sensitivity. Subsequent studies have confirmed these conclusions and have improved markedly the identifications of pulmonary lesions.

It should be mentioned briefly, although it is a matter of great importance, that health education for the general public, the tuberculous and their families, and professional groups, can encompass the entire field of tuberculosis control. The United States Public Health Service and the National Tuberculosis Association cooperate in the production of health education materials and work constantly day in and day out to inform the public of protective health measures and of the nature of tuberculosis as a family and community disease.

We feel strongly that tuberculosis can be controlled in any nation if control procedures such as those I have described are effectively applied. As the States of the United States work together to defeat this dreaded disease, the nations of the Western Hemisphere, sharing their experiences, facilities, and knowledge, can in concert bring tuberculosis low. We should think in terms of unity against our enemy—disease—as seriously as we think in union against threats to peace.

There is no doubt in our minds that tuberculosis can be eradicated as a plague of the people of the world. The health, the hope, the aspirations of men, now blighted by an insidious and debilitating disease, can be restored to hundreds of thousands of sick persons, so as to make them useful members of our nations. Only then can the forces of mind and spirit, defeated by preventable deaths, and weakened by lingering disease, be fully utilized in the development and maintenance of a healthy and productive world.

HISTOPLASMIN SENSITIVITY AMONG SIBLINGS [1]

By Shirley H. Ferebee, *Statistician*, and Michael L. Furcolow, *Surgeon*, *United States Public Health Service*

Search for the cause of pulmonary calcification in persons who do not react to tuberculin led recently to the finding of a high correlation between such calcifications and reactions to skin tests with histoplasmin. Thus, Christie and Peterson (*1*) and Palmer (*2*, *3*) have shown that, in certain geographic areas, among tuberculin nonreactors, nearly all persons who have pulmonary calcifications are reactors to histoplasmin. The conditions which produce histoplasmin sensitivity are still unknown, but it seems reasonable to assume that reactions to histoplasmin and the associated pulmonary lesions are specific evidence of some kind of infection, even though the mode of transmission, clinical symptoms, and in fact, the entire etiology still remain undetermined. The fact that no definite syndrome has been described indicates that the infection is of a relatively benign nature, producing such mild effects in most instances as to pass unrecognized as an illness more serious than a mild respiratory infection.

The present study is an attempt to obtain further information regarding sensitivity to histoplasmin by determining whether there is a similarity in the skin reactions of members of the same family. If it were demonstrated that the several members of a family react similarly to histoplasmin, the implication would be that the agent producing sensitivity would tend to be present, or absent, among conditions that affect members of a family group. These conditions could be genetic, broad environmental (social, economic, geographic, etc.) or specific environmental factors localized in the home (common food supply, household pets, etc.).

MATERIALS AND METHODS

Material for the present study was taken from a survey of approximately 16,000 Kansas City, Mo., school children who were skin tested with tuberculin and histoplasmin during 1945. The schools selected for the survey were a cross section of nursery, elementary, and high schools, and one junior college, and were representative of the varying socioeconomic levels of the city. The children ranged in age from less than 1 year to 19 years. Detailed description of the age, race, sex, and other characteristics of the group with respect to tuberculin and histoplasmin sensitivity has been reported by Furcolow et al. (*4*).

The survey was a cooperative effort of the Public Schools, the Health Department, and the Tuberculosis Society, of Kansas City, Mo., and the United States Public Health Service. The histoplasmin (H_3)

[1] From the Field Studies Section, Tuberculosis Control Division

was furnished by Dr. Chester Emmons of the National Institute of Health. The test consisted of the intracutaneous injection of a dose of 0.1 cc. of a dilution of 1 to 1,000 of a broth filtrate of a culture of *Histoplasma capsulatum.* If the induration measured 5 or more millimeters 48 hours after injection, the individual tested was considered a reactor. All others were considered nonreactors.

Since the children tested included many brothers and sisters, it was possible to assemble data on partial family groups from which a study could be made of the similarity of histoplasmin reactions among siblings.

At the outset of the present study, it is necessary to consider certain information now available regarding sensitivity to histoplasmin. Most significant is the fact that there are extreme variations in different parts of the country with respect to prevalence of histoplasmin reactors. In fact, whether an individual does or does not react to histoplasmin depends as much upon his place of residence as upon any other single factor now known. In some geographic areas, for example Colorado and Minnesota, it is rare to find a permanent resident who reacts to histoplasmin. In other areas, such as Missouri and Tennessee, reactors are more common than nonreactors.

A tabulation disregarding residence history of the sibling groups found in the Kansas City school survey would necessarily show that in some families none, or relatively few, of the children are reactors, while in others many or most of the siblings are reactors.

Some children have lived all their lives in Kansas City while others may have very recently moved there from areas where the frequency of reactors is extremely low. It would be expected that all or nearly all of the children in a family which has recently moved to Kansas City from Colorado would not react; while many of the children in a family which has always lived in Kansas City would react. Since families from areas with different levels of histoplasmin sensitivity would reflect the geographic differences in rates, and since the members of these families would tend to resemble each other because of their common residence history, demonstration of a familial factor in siblings in which previous residence is not controlled could be simply a demonstration of a fact already known: that rates of histoplasmin sensitivity differ from one area to another. A more pertinent investigation, therefore, is to determine whether among permanent residents of a single geographic area, there is a similarity among siblings in histoplasmin reaction.

With this objective in mind, the present study was limited to sibling groups who had always lived in Kansas City and its immediate environs. Further, because observed differences in rates of reactors between white and colored children in Kansas City would operate in a

somewhat similar way to that in which the geographic factor applies, it was decided to base the study only on white children.

As family rosters were not available, children who had the same surname were matched and considered siblings if the items of street address, parent's name, family doctor, and residence history were in agreement.

The statistical analysis used in the present study is one which is generally referred to as the index case method. The oldest child tested in each family group was arbitrarily designated as an index case. If the index case reacted to histoplasmin, the younger children in the family were classified as siblings of a reactor and placed in a group designated as S_R. If the index case did not react to histoplasmin, the younger children were classified as members of the S_N group, siblings of a nonreactor. It should be noted that the S_R and S_N groups consist only of younger siblings and do not contain the index cases themselves. The index cases were used only to select two contrasting groups of younger siblings.

Application of this procedure to white lifetime [2] residents among the survey group provided 1,420 family groups in which two or more children were tested. The distribution of these families according to the number of children tested is shown in table 1.

TABLE 1.—*Number of families, index cases, and younger siblings among school children tested in 1945 who were white lifetime residents of metropolitan Kansas City, Mo., according to number of tested siblings per family*

Number of tested siblings per family	Number of families	Number of children				
		Tota	Index	Younger siblings		
				Total	S_R group	S_N group
Total	1,420	3,164	1,420	1,744	766	978
2	1,166	2,332	1,166	1,166	515	651
3	204	612	204	408	194	214
4	37	148	37	111	34	77
5	7	35	7	28	12	16
6	5	30	5	25	5	20
7	1	7	1	6	6	

Each family contained one index case, the oldest child, and one or more younger siblings. For example: each two-child family contained one index case and one younger sibling; each four-child family contained one index case and three younger siblings.

The results reported below compare, in a variety of ways, the proportion of histoplasmin reactors in the two groups of younger siblings—S_R, younger siblings of index cases which reacted, and S_N, younger siblings of index cases which did not react to histoplasmin.

[2] Children were classified as "lifetime residents" of metropolitan Kansas City if they had never resided away from the city or its environs for longer than 6 months at any one time.

RESULTS

Tabulation of the results of the histoplasmin tests of the two groups of younger siblings discloses that 309 of the 766 S_R siblings, and 239 of the 978 S_N siblings reacted. A crude indication of the familial tendency in histoplasmin sensitivity is shown by the fact that 40.3 percent of the S_R siblings and only 24.4 percent of the S_N siblings were reactors. That is, the frequency of reactors was 15.9 points higher among S_R children, whose older brother or sister (the index case) was a reactor, than among S_N children, whose older brother or sister was a nonreactor, a relative difference of more than 65 percent.

Although the difference between the crude rates of histoplasmin reactors in the two groups, S_R and S_N, is statistically significant, the demonstration of a difference does not necessarily establish the existence of a familial factor. It first becomes necessary to investigate whether other factors may not have produced all or part of the observed difference.

Circumstances or conditions affecting the composition of the two subgroups, S_R and S_N, may be broadly divided into two categories; first, those which are characteristics of the family, either common environment or common genetic factors, and second, those which are characteristics of the individual. Geography and race, factors controlled at the beginning of the analysis, are examples of characteristics common to all members of a family group. Age and sex, on the other hand, are examples of attributes of the individual. Characteristics specific for the individual and not common to all members of a family could produce a similarity in histoplasmin reactions between siblings if the presence or absence of such characteristics affected histoplasmin sensitivity, and if they appeared in unequal proportions in the two groups, S_R and S_N.

It has been shown by Furcolow et al. (*4*) that histoplasmin sensitivity is closely related to age: the percentage of reactors among white lifetime residents of Kansas City increases from 5 at the age of 2 to nearly 70 at the age of 18. Similarly it has been shown (*3*) that there is a slight but consistent difference in histoplasmin sensitivity between the sexes: the percentage of reactors among males is 6 to 8 points higher than among females. It therefore becomes necessary to investigate whether age and sex may have produced all or part of the difference observed in the percentage of reactors among younger siblings (40.3 percent in the S_R group and 24.4 in the S_N group).

The percentage of reactors in the various combinations of S_R and S_N groups by sex of index case and by sex of younger sibling is shown in table 2. It will be seen that although there is a considerable variation in the prevalence of reactors according to the sex combination, the S_R groups are consistently higher than the S_N groups in the percentage of

TABLE 2.—*Number tested and percentage of histoplasmin reactors among S_R and S_N groups according to sex of index case and sex of younger sibling*

[White school children tested in 1945 who were lifetime residents of metropolitan Kansas City, Mo.]

Sex		Number tested		Percent reactors			
				Crude rates		Standardized rates [1]	
Index	Younger sibling	S_R group	S_N group	S_R group	S_N group	S_R group	S_N group
Total		766	978	40.3	24.4	37.9	26.9
Male	Male	211	232	44.1	25.9	42.3	30.4
Male	Female	206	240	36.4	22.9	34.5	26.1
Female	Male	177	254	38.4	23.2	35.4	25.4
Female	Female	172	252	42.4	25.8	38.6	28.1

[1] Average rates standardized for age distribution of index cases. The standardized rates used in this paper have been obtained by applying rates for individual age points to a standard population, the total of all children in the Kansas City surveys.

reactors. Whatever the sex of the index case and whatever the sex of the younger sibling, a greater proportion of reactors is found among siblings of index cases which react.[3]

Examination of the sex composition of the two groups, S_R and S_N, discloses that males comprise 50.5 percent of the S_R group and 49.7 percent of the S_N group. Since the sexes are represented almost equally in the two groups and the sex difference in histoplasmin sensitivity is not large among all Kansas City school children, it does not appear that sex could have produced any appreciable part of the observed difference in the frequency of reactors in the S_R and S_N groups.

The ages of the individuals in the family units affect the frequency of reactors in those families, and consequently, in the two groups of younger siblings, S_R and S_N. In this study, the material has been analyzed from two points of view with respect to age. While the simplest and most direct method is not entirely satisfactory, it is necessary to consider it first in some detail.

The initial analysis to take account of the age factor is simply to subdivide both the S_R and S_N groups according to age, calculating for each separate age class the percentage of histoplasmin reactors. The result of this procedure is shown in table 3 and figure 1. From examination of this material it is evident that at all but the earliest ages, the percentage of reactors is higher in the S_R than in the S_N group. After the fourth year, the frequency of reactors in the S_R group is from 7 to 16 points higher than in the S_N group. In other words, when the age of the younger siblings has been controlled by this rather simple procedure, the rate of reactors is higher among siblings of a reactor than among siblings of a nonreactor.

Although straightforward, this method of analysis takes account only of the age of the children composing the two groups, S_R and S_N.

[3] A complete analysis of histoplasmin reactors among the different combinations of siblings according to sex is beyond the scope of this paper. Further investigation with other techniques is planned.

TABLE 3.—*Number tested and percentage of histoplasmin reactors among S_R and S_N groups according to their age*

[White school children tested in 1945 who were lifetime residents of metropolitan Kansas City, Mo.]

Age of younger sibling	Number tested		Percent reactors [1]	
	S_R group	S_N group	S_R group	S_N group
Total	766	978	40.3	24.4
Under 3	2	29		3.4
3–4	20	40	5.0	5.0
5–6	138	276	26.1	10.1
7–8	154	241	29.9	22.4
9–10	155	168	39.4	31.5
11–12	116	101	51.7	40.6
13–14	125	102	56.8	48.0
15–16	53	20	60.4	55.0
17–18	3	1		

[1] Rates based on less than 10 children not computed.

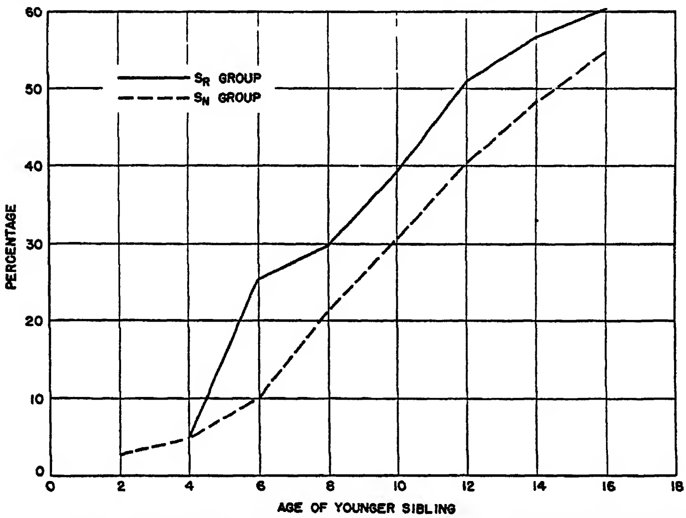

FIGURE 1.—Percentage of histoplasmin reactors among S_R and S_N groups according to their age: White school children tested in 1945 who were lifetime residents of metropolitan Kansas City, Mo. (Rates based on less than 10 children not shown.)

There is, however, another influence which age might have on the results—that produced by the age of the index cases, whose histoplasmin reactions were used to define the two groups S_R and S_N. To make the analysis entirely independent of the age factor, it would be necessary to classify members of the S_R and S_N groups not only by their own age but also by the age of the older brother or sister (the index case) and then to compare the percentage of reactors in the two groups S_R and S_N for each combination of age of index case and age of younger sibling.

Table 4 below shows for the S_R and S_N groups the number of reactors among the number of younger siblings tested, according to the age of the sibling and the age of the index.

TABLE 4.—*Number of histoplasmin reactors and nonreactors among S_R and S_N younger siblings, by age of younger sibling and age of index case*

[White school children tested in 1945 who were lifetime residents of metropolitan Kansas City, Mo.]

Age of index	Histoplasmin reaction of younger sibling	Age of younger sibling															
		Total	Under 4	4	5	6	7	8	9	10	11	12	13	14	15	16	17
		S_R group (766 siblings of index cases which react to histoplasmin)															
Total	R[1]	309		1	13	23	24	22	25	36	33	27	33	38	22	10	2
	N[2]	457	5	16	46	56	55	53	40	54	26	30	31	23	19	2	1
Under 5	R																
	N																
5	R																
	N	3		1	2												
6	R	3		1	1	1											
	N	7	3	3	1												
7	R	5			4	1											
	N	4		1	2	1											
8	R	6			3	3											
	N	22	1	3	7	10	1										
9	R	12			1	4	5	1	1								
	N	25		2	5	4	10	4									
10	R	18				6	3	6	3								
	N	41		1	9	6	10	9	4	2							
11	R	28				2	4	6	8	7	1						
	N	55	1	2	8	7	10	10	11	5	1						
12	R	25			3	1	4	1	4	7	5						
	N	62			4	12	5	10	8	13	9	1					
13	R	28			1	3	2	2	1	9	8	1	1				
	N	48		1	4	6	4	7	6	11	5	4					
14	R	51				1	4	4	4	6	10	12	9	1			
	N	38		1	2	3	2	3	3	6	4	9	5				
15	R	42				1	1	1	3	3	4	7	11	10	1		
	N	68		1	1	4	6	6	5	9	4	8	15	7	2		
16	R	52						1	1	2	4	4	8	20	10	2	
	N	56			1	2	5	1		7	3	4	10	13	10		
17	R	29					1			2	1	3	3	5	9	5	
	N	26				1	2	3	3	1		4	1	3	5	2	1
18	R	6												1	1	3	1
	N	2													2		
19	R	4											1	1	1		1
	N																
		S_N group (978 siblings of index cases which do not react to histoplasmin)															
Total	R[1]	239	1	2	15	13	18	36	30	23	19	22	21	28	10	1	
	N[2]	739	45	21	136	112	111	76	64	51	41	19	34	19	6	3	1
Under 5	R	1	1														
	N	17	17														
5	R																
	N	30	20	1	9												
6	R	2			1	1											
	N	27	3	7	11	6											
7	R	2			2												
	N	54	3	3	34	14											
8	R	7			2	2	1	2									
	N	62		4	20	23	14	1									
9	R	19			6	4	6	2	1								
	N	74		1	13	18	28	14									
10	R	22		1	2	1	2	11	5								
	N	56	1	1	10	13	14	10	6	1							
11	R	28				2	4	9	8	5							
	N	74	1	2	8	12	10	17	19	4	1						
12	R	19			1		1	3	9	3	2						
	N	94			11	9	18	17	11	16	10	2					
13	R	21				3		5	3	4	2	2	2				
	N	72		2	9	8	12	7	10	12	8	3	1				
14	R	30			1		4	2	1	6	5	7	4				
	N	61			6	5	7	2	9	8	12	5	6	1			
15	R	29		1				1	2	3	5	6	8	2	1		
	N	54			3	2	6	6	5	6	5	1	15	5			
16	R	43								2	1	6	6	22	6		
	N	49			1	2	1	1	3	4	3	7	9	13	3	2	
17	R	12						1	1		3		1	4	2		
	N	14			1		1	1	1		2	1	3		3		1
18	R	4									1	1			1	1	
	N	1														1	
19	R																
	N																

[1] R=Reactor. [2] N=Nonreactor.

From examination of the data in table 4, it is obvious that to obtain stable rates of the frequency of reactors for an age-by-age comparison would require a much larger number of observations than are available in this material. From these data, however, it is possible to obtain some information which bears on the problem of determining the effect of ages of sibling and of index case on the analysis of familial factors in histoplasmin sensitivity. Table 5 and figure 2 show the average age of the index cases of S_R siblings and S_N siblings according to the age of the sibling. It will be seen that S_R siblings of nearly all ages have older index cases than S_N siblings. The effect

TABLE 5.—*Number and average age of index cases according to the age of the younger siblings in the S_R and S_N groups*

[White school children tested in 1945 who were lifetime residents of metropolitan Kansas City, Mo.]

Age of younger sibling	Number of index cases		Average age of index cases [1]	
	S_R group	S_N group	S_R group	S_N group
Total	766	978		
Under 3	2	29		4.3
3-4	20	40	8.9	7.2
5-6	138	276	10.5	9.3
7-8	154	241	11.9	11.1
9-10	155	168	12.9	12.6
11-12	116	101	14.2	14.3
13-14	125	102	15.6	15.5
15-16	53	20	16.6	16.5
17-18	3	1		

[1] Averages based on less than 10 children not computed.

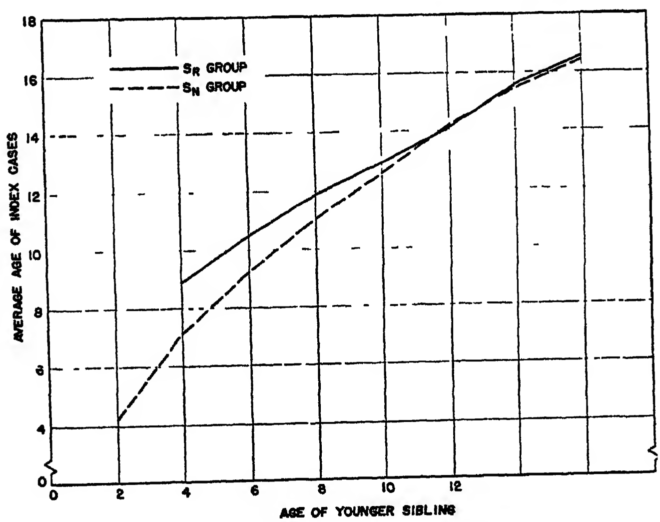

FIGURE 2.—Average age of index cases according to the age of the younger siblings in the S_R and S_N groups: White school children tested in 1945 who were lifetime residents of metropolitan Kansas City, Mo. (Averages based on less than 10 children not shown.)

of such differences in ages of the index cases on the proportion of histoplasmin reactors in the S_R and S_N groups is difficult to evaluate. It is clear, however, that any possible influence of the age of the index case is not fully controlled when, as in table 3 and figure 1, the S_R and S_N groups are compared according to age of the siblings.

Another method of analysis, which more adequately controls the ages both of siblings and their index cases, is presented. The method involves the comparison of the S_R and S_N groups through the subdivision of the sibling groups according to the ages of the index cases. Examination of table 6 and figure 3, which give the average ages of

TABLE 6.—*Number and average age of the younger siblings in the S_R and S_N groups according to the age of the index case*

[White school children tested in 1945 who were lifetime residents of metropolitan Kansas City, Mo.]

Age of index case	Number of younger siblings		Average age of younger siblings[1]	
	S_R group	S_N group	S_R group	S_N group
Total	766	978	-----------	-----------
Under 7	13	77	4.0	3.4
7–8	37	125	5.3	5.5
9–10	96	171	6.8	6.7
11–12	170	215	8.1	8.0
13–14	165	184	9.7	9.0
15–16	218	175	11.9	11.8
17–18	63	31	13.2	12.4
19–20	4	-----------	-----------	-----------

[1] Averages based on less than 10 children not computed.

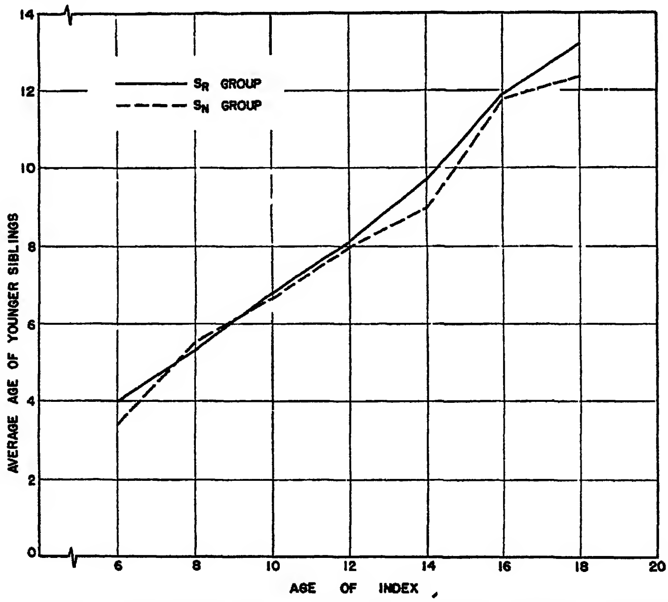

FIGURE 3.—Average age of S_R and S_N younger siblings according to age of index case: White school children tested in 1945 who were lifetime residents of metropolitan Kansas City, Mo. (Averages based on less than 10 children not shown.)

younger siblings of reactor and nonreactor index cases, shows that in every age class, the S_R and S_N siblings have very nearly the same average age. It appears that the histoplasmin sensitivity of the index cases has no differential effect on the ages of their younger siblings; that is, the younger siblings of a reactor have practically the same age distribution as the younger siblings of a nonreactor. Comparison of figures 2 and 3 reveals that there is very much closer agreement between the average ages of S_R and S_N siblings according to the age of their index cases than there is between the average ages of index cases according to the age of their S_R and S_N siblings.

The foregoing investigation of the age factor in the comparison of the S_R and S_N groups leads to the conclusion that subdivision of the two groups according to the age of index case would come closer to the complete control of the age factor than does the more direct method of simply classifying the two groups of S_R and S_N children according to their own ages. Therefore, the 766 younger siblings in the S_R group and the 978 younger siblings in the S_N group have been subdivided according to the age of their index cases and the percentages of reactors among siblings have been calculated. The results of this analysis are presented in table 7 and figure 4.

TABLE 7.—*Number tested and percentage of histoplasmin reactors in the S_R and S_N groups according to the age of the index case*

[White school children tested in 1945 who were lifetime residents of metropolitan Kansas City, Mo.]

Age of index case	Number tested		Percent reactors [1]	
	S_R group	S_N group	S_R group	S_N group
Total	766	978	40.3	24.4
Under 7	13	77	23.1	3.9
7–8	37	125	29.7	7.2
9–10	96	171	31.3	24.0
11–12	170	215	31.2	21.9
13–14	165	184	47.9	27.7
15–16	218	175	43.1	41.1
17–18	63	31	55.6	51.6
19–20	4			

[1] Rates based on less than 10 children not computed.

The percentage of reactors is higher at all ages among the S_R group than among the S_N group. Examination of table 7 and figure 4 shows that among siblings of an index case which reacts, the percentage of reactors rises from 23.1 for siblings of an index case under 7 years of age to 55.6 for siblings of an index case of the age group 17–18 years. Among siblings of an index case which does not react, the percentage of reactors increases from 3.9 for siblings of an index case under 7 years to 51.6 for siblings of an index case of 17 or 18 years of age.

The differences between the two groups decrease rather markedly

with increasing age of the index case. For siblings of index cases under 7 years of age, there is a difference of 19.2 points between the S_R and S_N groups, while for siblings of index cases of 17 or 18 years of

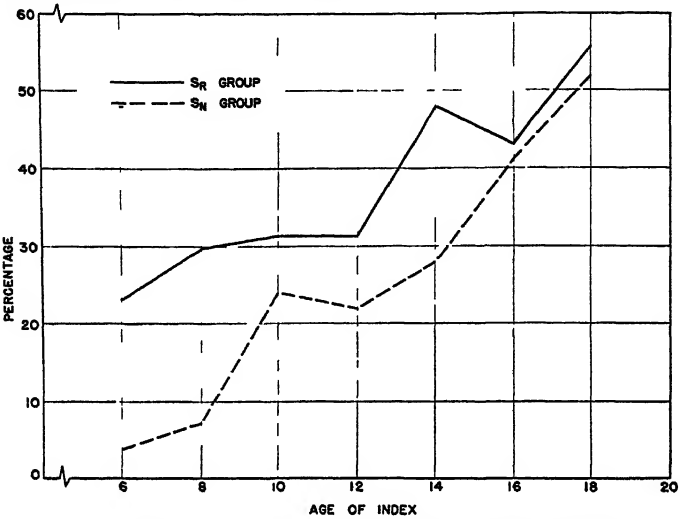

FIGURE 4 —Percentage of histoplasmin reactors among S_R and S_N groups of siblings according to the age of the index case White school children tested in 1945 who were lifetime residents of metropolitan Kansas City, Mo (Rates based on less than 10 children not shown)

age, the difference between the S_R and S_N groups is only 4 points.

The fact that differences in the percentage of positive reactors are greatest at the younger ages becomes even more striking when the difference between the S_R and S_N groups whose index cases are less than 9 years old is compared with the difference between the two groups whose index cases are 15 or more years of age. When the index case is less than 9 years old, the percentage of histoplasmin reactors is almost 4 times (or 375 percent) higher in the S_R than in the S_N group, while when the index case is 15 or more years old, the percentage is only 9 percent higher in the S_R than in the S_N group.

The data may be used to bring out further details of the similarity of histoplasmin reactions among siblings by consideration of the effect of the interval between the ages of the index case and the younger sibling. It is possible to subdivide the S_R and S_N groups according to the age-interval between the index case and the younger sibling. Table 8 and figure 5 show the percentage of reactors among the younger siblings in the S_R and S_N groups, first where the age interval between the index case and the younger sibling was no longer than 2 years, and second where the interval was longer than 2 years. While the subdivision of the data in this way reduces the number of cases in each age group to the point where percentages are less stable, there are apparently greater differences between the S_R and S_N groups when the

comparison is made for brothers and sisters who are less than 2 years apart in age. After rates have been standardized for age, there is a difference of 16.9 points between the S_R and S_N groups when the age interval is no more than 2 years, while the comparable difference between the two groups is 6.9 points if more than 2 years in age separates the index case and his sibling. That is, there is greater similarity in histoplasmin reactions of siblings when the ages of the children are closer.

TABLE 8.—*Number tested and percentage of histoplasmin reactors in the S_R and S_N groups, according to the age of the index case and the interval between ages of sibling and index case*

[White school children tested in 1945 who were lifetime residents of metropolitan Kansas City, Mo.]

Age of index case	Number of years between ages of index case and siblings							
	No longer than two years				Longer than two years			
	Number tested		Percent reactors [1]		Number tested		Percent reactors [1]	
	S_R group	S_N group	S_R group	S_N group	S_R group	S_N group	S_R group	S_N group
Total	328	432	[2] 44.4	[2] 27.5	438	546	[2] 25.4	[2] 18.5
Under 7	10	59	33.3	5.1	3	18	----------	0.0
7-8	22	93	36.4	7.5	15	32	20.0	6.3
9-10	45	84	35.6	29.8	51	87	27.5	18.4
11-12	68	70	41.2	25.7	102	145	24.5	20.0
13-14	55	41	58.2	41.5	110	143	42.7	23.8
15-16	101	77	53.5	50.6	117	98	34.2	33.7
17-18	26	8	69.2	----------	37	23	45.9	56.5
19-20	1	----------	----------	----------	3	----------	----------	----------

[1] Rates based on less than 10 children not computed.
[2] Average rate standardized for age distribution of index cases.

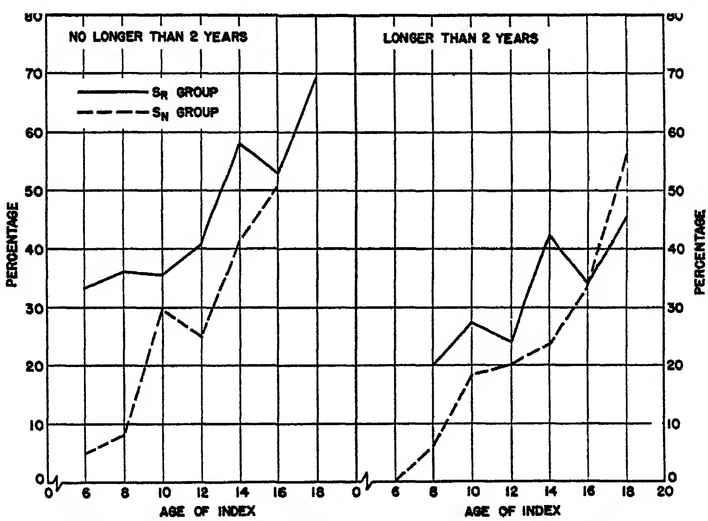

FIGURE 5.—Percentage of histoplasmin reactors among S_R and S_N groups of younger siblings according to the age of the index case and the interval between the ages of sibling and index.

The influence of the number of years between the ages of the index case and the sibling is reflected in the material shown in table 7 and figure 4. It is evident that when the index case (the older sibling) is only 6 years of age, the younger siblings must necessarily be closer in age to the index case than when the index case is, for instance, 16 years of age. Since the evidence in table 8 and figure 5 is that the difference in percentage of reactors in the S_R and S_N groups tends to become less with an increase in the number of years between the ages of index case and the younger sibling, it may well be that the convergence of the S_R and S_N curves in figure 4 is in part a result of the increase in the interval between the ages of the index case and the younger sibling. However, even when the index case and younger sibling are no more than 2 years apart in age, the differences in percentage of reactors in the S_R and S_N groups decrease with increasing age of index case.

DISCUSSION AND SUMMARY

The present paper, based on an analysis of histoplasmin skin tests of siblings found among white children who were lifetime residents of the metropolitan area of Kansas City, Mo., is an attempt to determine whether there is a similarity in histoplasmin reactions among children in the same family. The method of analysis involves a comparison of the percentage of histoplasmin reactors in two groups of younger brothers and sisters, those who have an older sibling who reacts to histoplasmin and those who have an older sibling who does not react to histoplasmin.

The analysis of 1,744 children, 766 of whom have an older sibling who reacts to histoplasmin and 978 of whom have an older sibling who does not react to histoplasmin, shows:

1. That there is a similarity in the histoplasmin reaction between children in the same family: The percentage of reactors is higher among children whose older sibling is a reactor than among children whose older sibling does not react.

2. That the similarity grows less marked as the children grow older: The difference in the percentage of reactors between children with an older sibling who reacts and children with an older sibling who does not, decreases with increasing age of the older child.

3. That the closeness in age of siblings influences the degree of similarity, as shown by the fact that the differences in percentage of reactors among siblings of a reactor and of a nonreactor are greater when there is no more than 2 years difference in age between the two children.

4. That, after the similarity between siblings produced by the known factors affecting the frequency of histoplasmin reactors

(geography, age, sex, and race) has been eliminated, there is still present some factor which makes siblings of a reactor more likely to react to histoplasmin than siblings of a nonreactor.

5. That the determination, by further detailed study, of the nature of the differences between siblings of a reactor and siblings of a nonreactor might well disclose other factors causing variation in levels of histoplasmin sensitivity.

While the analysis of the data given here clearly reveals a similarity between histoplasmin reactions of children in the same family in metropolitan Kansas City, it should be noted that there is not a high degree of concentration of reactors in some families and of nonreactors in other families. This suggests that the agent producing histoplasmin sensitivity is not likely to be confined to that type of factor which would be found within the common familial environment in some families and entirely lacking in the familial environment of others. Rather, there is implied a factor broader, and less localized, than one limited by familial environment.

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Abstract[1] of

DIAGNOSTIC DEMONSTRATION OF TUBERCLE BACILLI[2]

Demonstration of the presence of tubercle bacilli remains the surest means of detecting tuberculosis. Indeed, there is greater need for such demonstration as other diagnostic methods find increasing employment. Direct microscopic examination for tubercle bacilli does not suffice, and broad experience has taught that two other demonstration techniques are more reliable—cultivation and the inoculation of guinea pigs. For specimens with very few bacilli, the latter technique is generally preferred.

The State Serum Institute, Copenhagen, however, has found cultivation to be better as a rule than the guinea pig test. Jensen, Lester and Tolderlund presented evidence of the superiority of cultivation in

[1] From the Office of the Chief, Tuberculosis Control Division, United States Public Health Service.
[2] By Johannes Holm and Vera Lester, Tuberculosis Department, State Serum Institute, Copenhagen, Denmark; Acta Tuberculosea Scandinavica, vol XVI, Fasc pp 3–4 (1941).

a report [3] on the examinations made in the Tuberculosis Department of the Institute from January 1, 1937, to June 1, 1938.

Changes have since been made in the technique of cultivation employed in this department. The present study, based on plentiful material, compares the yielding capacity of the guinea pig test with that of cultivation as now practiced.

NATURE OF THE MATERIAL

In the extended examination for tubercle bacilli in man, the Tuberculosis Department of the Institute serves as a central laboratory for the entire state of Denmark. Specimens of various kinds are received—gastric lavage, expectorate, pleural tissue, spinal fluid, urine, etc. Some are sent in for verification of positive findings and for typing of the bacteria. Most of the expectorates contain relatively few tubercle bacilli, undetected by repeated microscopy.

From June 1, 1938, to February 28, 1941, the department examined 40,956 specimens, of which 20,090 were tested simultaneously by cultivation and guinea pig inoculation. The presence of tubercle bacilli was demonstrated in 3,731 of the specimens that were examined by both techniques. These positive findings are the basis of the following comparison.

COMPARISON OF THE RESULTS OF CULTIVATION AND GUINEA PIG INOCULATION

In comparing the two techniques, the types of tubercle bacilli found in the specimens must be considered. The bovine type is much harder to cultivate than the human type, and in demonstrations of the former, the guinea pig test is superior to cultivation. Typing was possible for every positive specimen. The 3,731 positive findings, tabulated as to demonstration technique and type of organism, are presented in table 1.

TABLE 1.—*Comparison of cultivation and guinea pig inoculation as techniques for demonstrating tubercle bacilli, based on 3,731 positive specimens*

Type of tubercle bacilli	Number of specimens				
	Guinea pig test		Cultivation		Total positive: (1) and (3)
	(1) Positive	(2) Failed	(3) Positive	(4) Failed	
Human	2,500	773	3,026	247	3,273
Bovine	402	56	382	76	458
Total	2,902 +	829 or	3,408 +	323 =	3,731

[3] Acta Tuberculosea Scandinavica, vol. XIV, p 124 (1940).

In addition to positive findings, table 1 gives the number of specimens for which either method failed. Naturally the number is minimal, since only those failures are included that were proved by the other test. The guinea pig test was said to have failed if no sign of tuberculosis was discovered at autopsy, either 6 weeks after inoculation or upon death of the animal before the 6 weeks had passed. Cultivation failed if no colony of tubercle bacilli appeared *in vitro* 6 weeks after inoculation, or if the cultures were "contaminated"—overgrown with bacteria other than tubercle bacilli.

Table 1 indicates that cultivation is considerably more sensitive on the whole than guinea pig inoculation. While cultivation failed in 323 instances (8.6 percent of 3,731), the guinea pig test failed in 829 (22.2 percent).

In the demonstration of bovine tubercle bacilli, the guinea pig method was superior. Guinea pig inoculation failed for 56 (12.2 percent) of the 458 bovine-positive specimens, while cultivation failed for 76 (16.6 percent).

The relation of cultivation failures to kind of specimen is shown in table 2.

TABLE 2.—*Distribution of cultivation failures by kind of specimen, showing proportion of failures to total specimens positive*

Kind of specimen	Total specimens positive	Cultivation failed (guinea pig test positive)	
		Number	Percent
Gastric lavage	1,371	95	7
Expectorate	543	21	4
Pleural exudate	247	24	10
Spinal fluid	96	6	6
Urine	886	135	15
Pus, tissue, etc.	888	42	7
Total	3,731	323	8.6

The success of the guinea pig test depends largely upon whether the inoculum is homogenized. Specimens used for guinea pig inoculation were tested in the native state, unless judged to contain numerous microbes pathogenic for animals. The best results of inoculation were obtained with urine specimens, tested in the native state in most instances. Nearly all specimens were homogenized for cultivation, though even gentle homogenization so damaged the organisms that the results were adversely affected.

Colony count was used to estimate the bacillary content of cultures, which varied considerably with the kind of specimen. The larger the content, the greater the probability of a positive guinea pig test. When cultivation yielded more than 100 colonies of tubercle bacilli per tube, a guinea pig inoculated with that specimen rarely failed to

show tuberculosis; and when the number of colonies was five or less, the inoculation failed in about half the tests—more often with human tubercle bacilli than with bovine.

An established procedure in this department has been to divide each specimen equally for inoculation and cultivation. Even so, it might be assumed that an absence of tubercle bacilli from the portions used for inoculation is responsible for the increasing failures as the bacillary content falls. The assumption, however, can hardly be accepted as a full explanation of the increase in failures when the amount of increase is considered.

It is concluded that a certain minimal number of tubercle bacilli capable of propagation is required for the production of tuberculosis in guinea pigs. This number probably depends on several conditions. Doubtless the initial virulence of the bacilli and the degree of attenuation from homogenization are significant. The variable resistance of the guinea pigs is an important factor.

FAILURES OF THE TESTS

Throughout the study period, 122 cultures were contaminated and 136 guinea pigs died from causes other than tuberculosis. These failures showed a pronounced seasonal variation. A distribution of the data by months (combined—e. g., June 1938–40 data under "June") is presented in table 3.

TABLE 3.—*Distribution, by months, of failures from contaminated cultures and guinea pig deaths (nontuberculous), based on 3,731 positive specimens*

Month (June 1, 1938–Feb. 28, 1941)	Total positive specimens	Failures			
		Contaminated cultures		Guinea pig deaths	
		Number	Percent	Number	Percent
January	350	8	2.3	25	6.6
February	333	6	1.8	16	4.8
March	277	5	1.8	12	4.3
April	247	7	2.8	13	5.3
May	288	14	4.9	16	5.5
June	366	14	3.8	12	3.3
July	315	16	5.1	5	1.6
August	320	19	5.9	3	.9
September	279	8	2.9	7	2.5
October	321	10	3.1	5	1.6
November	369	11	3.0	11	3.0
December	266	4	1.5	13	4.9
Total	3,731	122	3.3	136	3.7

The percentage of contaminated tubes was highest in the summer months, May–August. This may be explained by the fact that during transit to the Institute the contaminating microbes have an opportunity for multiplication, to which heat is conducive.

The seasonal variation in failures from guinea pig deaths, more

frequent in winter and spring, may be associated with the general resistance of the animals. Infection with type 19 pneumococci caused the great majority of nontuberculous deaths. Nearly all the guinea pigs were carriers, and experiment showed that many died from pneumococcal infection when resistance was lowered by change of diet. During the months when most deaths occurred, the diet of the animals had less sufficiency.

Attempts were made to determine whether general resistance was a factor in the incidence of tuberculosis. Further comparisons of the results of testing by the two methods revealed that the sensitivity of inoculation did not increase as general resistance fell The conclusion must be that seasonal variations in diet did not alter the resistance of the guinea pigs to infection with tubercle bacilli.

DISCUSSION

On the basis of the present material, it is reasonable to conclude that the guinea pig test could safely be omitted for a large proportion of specimens. Of 20,090 specimens tested by cultivation and guinea pig inoculation, 3,731 were found to contain tubercle bacilli. If cultivation alone had been used, tubercle bacilli would have been missed in only 323 instances of demonstrable presence. For each failure of cultivation, 62 guinea pigs were employed.

The Tuberculosis Department has adopted the procedure of only using the guinea pig test for examination of urine and a few other specimens, such as tissue that cannot be readily divided for cultivation. (See table 2.) Rather than examine one specimen by both techniques, the department will examine two specimens from the same patient by cultivation alone.

When cultivation alone is used, the examiner must be highly skilled. The work involves the danger of mistaking saprophytes for tubercle bacilli, and only great experience enables one to distinguish with certainty between colonies of the two groups. Even the expert will sometimes be doubtful, and he must then test the suspected colony on guinea pigs. Intracutaneous inoculation is particularly suitable, since it permits the testing of as many as four cultures on one animal. Results are obtained earlier by this method than by intraperitoneal or subcutaneous inoculation.

Cultivation offers other than economic advantages over the guinea pig technique. Typing is made possible through direct observation of the colonies. Again, a positive diagnosis can usually be obtained in 3 or 4 weeks, whereas 6 weeks is required for the guinea pig test.

The technique of cultivation as now practiced in the Tuberculosis Department of the State Serum Institute, Copenhagen, is described below. [The passage is quoted from the original article.]

CULTIVATION OF TUBERCLE BACILLI

The two most important factors in good culture results are a suitable culture medium and proper treatment of the material that is to be examined; and this requires a well-trained personnel under continual control.

The culture medium employed by this department for the last 10 years is a modification of Löwenstein's medium as given by K. A. Jensen (Centralbl. f. Bact. I Abt. Orig. p. 125, 1932) but since modified somewhat. It now is made up as follows:

Löwenstein's Medium

	Percent	*1 flask*	*4 flasks*
Salt solution:			
Monopotassium phosphate	0. 4	2.4 g.	9.6 g.
Magnesium sulphate	0. 04	0.24 g.	0.96 g.
Magnesium citrate	0. 1	0.6 g.	2.4 g.
Asparagin	0. 6	3.6 g.	14.4 g.
Glycerine (twice distilled)	2	12 cc.	48 cc.
Redistilled water		600 cc.	2400 cc.
Potato flour	5	30 g.	4 X 30 g.
Eggs		1 l.=1⅝ kg.	4 l.=5½ kg.
Malachit-green 2 percent sol.		20 cc.	80 cc.

The salt solution is heated in a pot till all is dissolved; then it is poured into flasks, 612 cc. into each flask, and "koched" for 2 hours. Next day 30 g. of potato flour is added to each flask.

The flasks are boiled under continual shaking, on water-bath, till the content is clear; then boiling for 15 minutes whereafter the flasks are left standing in water-bath for 1 hour at 56°.

Only fresh eggs are employed—eggs laid by hens fed on greens.

The eggs are washed in a 5 percent soda and soap solution for 30 minutes; then they are placed in running cold water (till this water is perfectly clear); then they are broken into a sterile flask, shaken well and filtered through sterile gauze.

Two liters of egg are mixed with 2 flasks of salt solution and to this is added 40 cc. of malachit-green. The mixture is left standing for 1 hour before tubing into tubes of Jena glass, in a layer of about 5½ cm. in height. The medium is solidified in slanting tubes at 88°–85° for 40 minutes. The cotton stoppers are trimmed and paraffined.

As tubercle bacilli of bovine type grow more rapidly and readily on media containing no glycerine, another batch of this medium is made up after the same recipe with omission of glycerine.

For each specimen 5 culture tubes are employed, 3 with glycerine and 2 without.

It is very important that the preparation of the culture medium follow closely the given directions, as even small changes may jeopardize the result. It is advisable to keep the culture medium at cellar temperature, not exposed to drying or sunshine. The medium should be used fairly soon after its preparation. In most of our cases the medium has been only a few days old, and very seldom has it been more than 1–2 weeks old.

As contamination of the cultures is the reason for a high percentage of the failures, it is important in every way to take precautions against this possibility. For this reason, as far as possible, the specimens are taken under treatment as soon as they arrive at the institute; or they are placed at once in a refrigerator, where they are left till they can be dealt with. This applies especially to the gastric lavage specimens, which are received in 300 cc. flasks and left standing overnight for sedimentation.

For the same reasons, care is taken that only sterilized instruments and utensils come in contact with the specimens. Hence the institute supplies the physicians and hospitals with sterile mailing tubes for transport of the specimens.

The glasses, pipettes, dishes, rubber stoppers and rubber caps, homogenization fluids, and water used for the specimens are sterilized, and great care is taken not to expose them to contamination in the many manipulations.

The treatment of the specimens takes place in centrifuge tubes with a capacity of about 12 cc. During the homogenization, which requires energetic shaking of the specimen, the tubes are stoppered with a reversed rubber stopper; otherwise they are sealed with a tight-fitting rubber cap—for instance during the centrifuging, which is done at a rate of 3,000 revolutions per minute for 15 minutes.

The homogenization is carried out either with 6 percent H_2SO_4 at room temperature for 10 minutes, or with 4 percent NaOH at 37° for 15 minutes, depending on the nature and consistency of the specimen.

Acid homogenization is used for all the specimens which contain no solid, tough, or very slimy elements (most specimens of gastric lavage and urine, clear pleural exudate, ascitic fluid, spinal fluid, and synovial fluid, without any large clots, besides a few specimens of sputum and pus). All liquid specimens are first centrifuged for 15 minutes, and the sediment is used for the examination. Of the more solid specimens (sputum, pus, etc.) about 2 cc. is withdrawn for examination. Such a sample is mixed with about 2 cc. 6 percent H_2SO_4, and the mixture is shaken energetically, left standing at room temperature in the dark for 10 minutes during which it is repeatedly shaken vigorously. Then the tube is filled with distilled water, and it is centrifuged. Culture tubes are inoculated with the sediment (not neutralized).

Alkali homogenization is employed for the other specimens, especially the ones that are fairly solid or very slimy, on which a marked mixed infection is suspected (most specimens of expectorate and pus, very slimy sediment from gastric lavage, 24-hour urine, feces, tissues, turbid or clotting exudates). A sample of 1–2 cc. of the specimen is transferred to a centrifuge tube, which then is filled two-thirds with 4 percent NaOH, whereafter it is shaken vigorously. The tube is incubated at 37° for 20 minutes, during which it is repeatedly shaken vigorously. After centrifuging, the sediment is neutralized with 1–2 drops of 2 n HCl (without indicator) and used for inoculation of the culture tubes.

In nearly every instance the cultures are made with homogenized material. But with clear specimens of pleural exudate, ascitic fluid, spinal fluid and exudate from synovial cavities, 1–2 culture tubes are inoculated with non-homogenized sediment from the first centrifuging.

The culture tubes are inoculated by means of a Pasteur pipette, and all the available sediment is used for the cultures. Immediately before the inoculation of a culture tube, all the condensation water is poured off from the tube.

The inoculated tubes are sealed carefully with paraffin and incubated for 6 weeks at 37°. All the tubes are inspected once a week, the first time 2 weeks after inoculation.

In cultures with vigorous growth, the growth may become macroscopically visible after 14 days. In a majority of cultures the growth becomes macroscopically visible within 4 weeks. From every specimen that gives macroscopically visible colonies, a smear is made that is stained after the Ziehl-Neelsen method. If necessary, the tubes are kept under further observation till a reliable type diagnosis may be made. If required, a subculture is made and tests carried out for estimation of the animal pathogenicity of the strain, partly in order to establish the typing if the colonies look somewhat atypical, partly to avoid that acid- and alcohol-fast saprophytes are mistaken for tubercle bacilli.

If the cultures show no macroscopic growth after 6 weeks, the result of the cultivation is regarded as negative without any further examination. No microscopic examination is made of smears from such cultures.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED MAY 17, 1947

Summary

Of the total of 39 cases of poliomyelitis reported for the week (last week 34), 15 occurred in California and 4 in New York. No other State reported more than 2 cases. For the corresponding week last year 83 cases were reported, and the 5-year (1942–46) median is 36. The total for the year to date is 894, as compared with 811 for the same period last year and a 5-year median of 519. The figure for the 9-week period since the approximate average week of seasonal low incidence (ended March 15) is 267, as compared with 344 for the corresponding period last year and a 5-year median of 217. States reporting more than 4 cases since March 15 are California (83), New York (29), Texas (18), Florida (14), Illinois (12), Louisiana (10), Michigan (9), Nebraska (9), Missouri (8), North Dakota (8).

Of the total of 9 cases of smallpox reported (last week 7, 5-year median 11), 3 occurred in Indiana, the only State reporting more than 1 case. One fatal case was reported in Ohio (see p. 861). The total for the year to date is 127, as compared with 206 for the same period last year and a 5-year median of 234.

Current and cumulative figures for measles, meningococcus meningitis, scarlet fever, typhoid and paratyphoid fever, and typhus fever are well below the respective corresponding medians. Similar figures for whooping cough are considerably above those of the past 3 years. To date, 621 cases of tularemia have been reported (356 same period last year), and 2,102 cases of undulant fever (1,684 same period last year).

Of 18 cases of Rocky Mountain spotted fever reported currently, 9 occurred in the South Atlantic area, 2 in the East North Central, 1 in New Jersey, 1 in Oklahoma, and 5 in the Mountain area. The total to date is 46, as compared with 56 for the same period last year.

Deaths recorded for the week in 93 large cities of the United States totaled 9,331, as compared with 9,190 last week, 8,901 and 9,202, respectively, for the corresponding weeks of 1946 and 1945, and 8,906 for the 3-year (1944–46) median. The total for the year to date is 198,445, as compared with 196,267 for the corresponding period last year.

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Telegraphic morbidity reports from State health officers for the week ended May 17, 1947, and comparison with corresponding week of 1946 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46
	May 17, 1947	May 18, 1946		May 17, 1947	May 18, 1946		May 17, 1947	May 18, 1946		May 17, 1947	May 18, 1946	
NEW ENGLAND												
Maine	2	2	0	------	2	------	146	318	69	1	0	0
New Hampshire	0	0	0	------	------	------	4	43	43	0	0	1
Vermont	0	0	0	------	------	------	158	83	83	1	0	0
Massachusetts	8	5	5	------	------	------	490	2,338	1,219	[5] 0	1	7
Rhode Island	0	0	0	------	------	------	213	64	44	2	0	1
Connecticut	0	3	1	2	2	2	955	411	438	1	1	2
MIDDLE ATLANTIC												
New York	14	25	15	[1] 2	[1] 4	[1] 4	671	4,125	1,316	9	12	26
New Jersey	10	12	2	3	5	5	577	3,893	1,261	1	0	10
Pennsylvania	23	12	10	(3)	[2] 1	[2] 1	286	2,573	1,591	5	11	11
EAST NORTH CENTRAL												
Ohio	7	10	7	10	7	7	834	727	469	7	3	13
Indiana	5	2	2	------	16	6	131	483	103	2	3	3
Illinois	3	8	17	1	4	4	227	868	536	5	7	14
Michigan [3]	5	7	6	------	2	2	112	1,407	661	4	8	8
Wisconsin	1	3	3	20	25	31	680	2,812	2,271	2	2	4
WEST NORTH CENTRAL												
Minnesota	8	5	3	------	------	------	655	66	388	1	2	2
Iowa	3	1	3	1	------	------	155	352	185	1	1	2
Missouri	5	3	3	3	5	1	28	188	201	2	5	5
North Dakota	0	1	2	3	------	------	91	10	67	1	0	0
South Dakota	0	7	1	------	------	------	81	29	29	0	0	0
Nebraska	0	4	3	8	5	5	14	280	264	1	1	0
Kansas	6	22	5	11	1	1	10	344	352	2	0	2
SOUTH ATLANTIC												
Delaware	1	1	1	------	------	------	------	23	23	0	0	0
Maryland [3]	5	14	13	5	------	1	63	683	369	0	1	7
District of Columbia	0	0	0	------	------	1	11	332	119	1	1	2
Virginia	3	10	4	333	100	103	269	779	376	2	4	6
West Virginia	0	1	3	8	------	------	16	100	97	2	1	1
North Carolina	10	10	8	------	------	------	162	542	402	7	0	2
South Carolina	8	5	5	310	157	175	151	264	213	1	0	2
Georgia	4	3	3	8	3	8	87	234	90	2	3	3
Florida	0	7	3	22	3	3	65	183	93	0	2	5
EAST SOUTH CENTRAL												
Kentucky	1	0	1	1	------	2	69	71	75	0	3	3
Tennessee	4	2	2	33	17	15	49	191	150	3	1	6
Alabama	5	3	3	88	14	23	208	154	114	1	0	7
Mississippi [3]	2	3	3	23	------	------	19	------	------	1	0	1
WEST SOUTH CENTRAL												
Arkansas	7	3	2	53	14	17	61	189	112	[5] 0	1	1
Louisiana	3	7	4	5	6	4	34	100	76	6	1	2
Oklahoma	2	6	3	79	22	22	3	223	180	0	3	1
Texas	17	25	23	416	415	415	304	1,577	733	5	6	6
MOUNTAIN												
Montana	0	0	0	5	1	2	43	182	118	0	0	0
Idaho	0	0	0	5	6	1	2	83	56	0	0	0
Wyoming	0	4	0	------	------	------	8	77	52	0	1	0
Colorado	5	2	6	14	6	14	72	897	315	0	0	1
New Mexico	2	1	1	1	6	2	72	65	41	0	0	0
Arizona	8	3	0	52	43	54	134	120	116	0	0	0
Utah [3]	1	0	0	------	1	3	5	353	253	0	0	0
Nevada	0	0	0	------	------	------	------	4	5	0	0	0
PACIFIC												
Washington	2	7	2	12	------	2	13	490	386	1	3	5
Oregon	1	1	1	10	3	11	11	322	115	0	0	2
California	14	9	18	12	13	51	214	2,665	2,665	6	5	19
Total	205	259	201	1,559	909	1,100	8,783	32,317	22,881	86	93	175
20 weeks	5,217	6,929	5,439	294,233	184,505	74,496	125,498	486,655	396,365	[5] 1,760	3,379	4,522
Seasonal low week [4]	(27th) July 5–11			(30th) July 26–Aug. 1			(35th) Aug. 30–Sept. 5			(37th) Sept. 13–19		
Total since low	12,783	18,573	14,192	327,208	546,753	110,358	148,386	512,779	434,378	[5] 2,732	4,883	6,974

[1] New York City only. [2] Philadelphia only. [3] Period ended earlier than Saturday.
[4] Dates between which the approximate low week ends. The specific date will vary from year to year.
[5] Delayed reports: Meningitis, Arkansas, weeks ended February 8 and February 15, 1 case each week, Massachusetts, week ended April 19, 1 case; (figures included in cumulative totals only).

Telegraphic morbidity reports from State health officers for the week ended May 17, 1947, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46
	May 17, 1947	May 18, 1946		May 17, 1947	May 18, 1946		May 17, 1947	May 18, 1946		May 17, 1947 [6]	May 18, 1946	
NEW ENGLAND												
Maine	0	0	0	15	32	32	0	0	0	0	0	0
New Hampshire	0	0	0	0	0	6	0	0	0	0	0	0
Vermont	0	1	0	2	5	11	0	0	0	0	0	0
Massachusetts	0	1	0	121	235	357	0	0	0	4	0	2
Rhode Island	0	0	0	6	10	17	0	0	0	0	0	0
Connecticut	1	0	0	34	69	69	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York	4	4	2	331	572	567	0	0	0	3	3	4
New Jersey	0	0	1	100	165	146	0	0	0	0	4	2
Pennsylvania	0	1	0	193	336	336	0	0	0	3	4	4
EAST NORTH CENTRAL												
Ohio	0	1	1	206	357	357	1	0	0	3	6	5
Indiana	1	0	0	55	46	59	3	7	1	0	1	1
Illinois	2	3	1	78	182	182	0	2	1	1	1	1
Michigan [3]	1	0	0	90	230	230	0	0	0	0	2	3
Wisconsin	0	0	0	68	100	203	1	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	0	1	0	69	48	69	0	0	0	0	0	0
Iowa	1	0	0	25	55	44	1	0	0	0	0	0
Missouri	1	1	0	37	53	53	0	0	0	0	1	1
North Dakota	0	0	0	11	11	11	0	0	0	0	3	0
South Dakota	0	0	0	1	6	22	1	0	0	0	0	0
Nebraska	2	0	0	8	24	24	0	0	0	0	0	0
Kansas	0	1	1	30	53	51	0	0	0	1	0	0
SOUTH ATLANTIC												
Delaware	0	0	0	6	8	8	0	0	0	0	1	0
Maryland [3]	0	2	0	26	200	155	0	0	0	1	1	1
District of Columbia	0	0	0	6	14	14	0	0	0	0	0	0
Virginia	1	1	1	19	63	46	0	0	0	1	2	2
West Virginia	0	0	0	18	23	23	0	0	0	0	0	1
North Carolina	0	2	0	17	31	27	0	0	0	1	0	1
South Carolina	1	0	3	3	6	6	0	0	0	0	5	5
Georgia	0	2	1	8	11	11	0	0	0	3	3	5
Florida	2	18	0	3	6	6	0	0	0	0	0	1
EAST SOUTH CENTRAL												
Kentucky	1	1	1	17	12	48	0	0	0	0	1	3
Tennessee	0	0	0	31	18	28	0	0	0	2	1	3
Alabama	1	0	0	1	19	10	0	0	0	0	0	2
Mississippi [3]	0	1	1	3	5	6	0	0	0	4	1	1
WEST SOUTH CENTRAL												
Arkansas	1	0	0	4	4	4	0	0	0	4	5	2
Louisiana	0	5	2	2	5	7	0	0	0	2	7	7
Oklahoma	1	0	0	4	9	10	1	0	0	0	5	2
Texas	2	10	4	21	46	46	0	0	0	8	4	10
MOUNTAIN												
Montana	0	0	0	8	20	20	0	0	0	1	0	0
Idaho	1	0	0	6	10	13	1	0	0	0	2	0
Wyoming	0	0	0	1	11	11	0	0	0	0	0	0
Colorado	0	11	0	39	45	56	0	0	0	0	1	0
New Mexico	0	2	0	8	14	14	0	0	0	0	1	1
Arizona	0	0	0	2	16	16	0	0	0	0	1	1
Utah [3]	0	0	0	21	20	20	0	0	0	0	0	0
Nevada	0	0	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	0	3	1	28	25	30	0	2	0	1	1	1
Oregon	0	0	0	17	43	22	0	0	0	1	2	0
California	15	11	8	100	148	148	0	0	0	3	4	4
Total	39	83	36	1,897	3,421	3,686	9	11	11	47	73	85
20 weeks	894	812	519	50,861	69,924	79,410	127	206	284	936	1,029	1,184
Seasonal low week [4]	(11th) Mar. 15–21			(32nd) Aug. 9–15			(35th) Aug. 30–Sept. 5			(11th) Mar. 15–21		
Total since low	267	344	217	77,547	108,495	117,731	181	282	351	451	554	583

[3] Period ended earlier than Saturday.
[4] Dates between which the approximate low week ends. The specific date will vary from year to year.
[6] Including paratyphoid fever reported separately, as follows: Massachusetts 4 (salmonella infection); Virginia 1; Georgia 1; Texas 4; California 2.

Telegraphic morbidity reports from State health officers for the week ended May 17, 1947, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Whooping cough			Week ended May 17, 1947							
	Week ended—		Median 1942–46	Dysentery			Encephalitis, infectious	Rocky Mt. spotted fever	Tularemia	Typhus fever, endemic	Undulant fever
	May 17, 1947	May 18, 1946		Amebic	Bacillary	Unspecified					
NEW ENGLAND											
Maine	26	27	23	------	------	------	------	------	------	------	------
New Hampshire	2	6	1	------	------	------	------	------	------	------	------
Vermont	13	13	13	------	------	------	------	------	------	------	4
Massachusetts	120	147	147	------	2	------	------	------	------	------	[7] 4
Rhode Island	46	21	21	------	------	------	------	------	------	------	------
Connecticut	49	35	56	1	------	------	------	------	------	------	2
MIDDLE ATLANTIC											
New York	184	155	213	3	1	------	1	------	------	1	7
New Jersey	242	171	171	1	------	------	------	1	------	------	------
Pennsylvania	194	110	186	------	------	------	------	------	------	------	1
EAST NORTH CENTRAL											
Ohio	------	81	144	1	------	------	------	------	------	------	------
Indiana	39	25	25	------	------	------	------	1	------	------	------
Illinois	82	107	100	6	------	------	------	1	1	------	7
Michigan [3]	182	158	158	------	------	------	------	------	------	------	5
Wisconsin	93	90	90	------	------	------	------	------	------	------	7
WEST NORTH CENTRAL											
Minnesota	49	13	13	------	------	------	------	------	------	------	4
Iowa	27	32	20	------	------	------	------	------	------	------	------
Missouri	31	12	15	------	------	1	------	------	2	------	2
North Dakota	------	------	1	------	------	------	------	------	------	------	------
South Dakota	------	------	1	------	------	------	------	------	------	------	------
Nebraska	9	7	6	------	------	------	------	------	------	------	22
Kansas	48	24	42	1	------	------	------	------	------	------	5
SOUTH ATLANTIC											
Delaware	4	2	2	------	------	------	------	1	------	------	------
Maryland [3]	100	12	59	------	------	2	------	3	------	------	------
District of Columbia	5	13	9	------	------	------	------	------	------	------	------
Virginia	73	51	63	1	------	87	------	5	1	------	1
West Virginia	19	40	12	------	------	------	------	------	------	------	------
North Carolina	151	100	110	1	1	------	------	------	------	3	------
South Carolina	166	49	105	2	24	------	4	------	------	1	1
Georgia	54	6	9	------	2	------	------	------	2	4	6
Florida	92	23	13	4	------	------	1	------	------	4	2
EAST SOUTH CENTRAL											
Kentucky	18	14	38	------	------	------	------	------	------	------	------
Tennessee	45	22	30	1	------	------	------	------	------	1	1
Alabama	108	12	32	------	------	------	------	------	------	------	1
Mississippi [3]	18	------	------	3	1	------	------	------	3	1	4
WEST SOUTH CENTRAL											
Arkansas	68	1	13	8	1	------	------	------	7	1	2
Louisiana	13	12	10	9	------	------	------	------	2	------	------
Oklahoma	16	11	15	8	------	------	------	1	9	------	------
Texas	824	182	247	5	289	21	------	------	2	17	11
MOUNTAIN											
Montana	7	8	8	------	------	------	------	2	------	------	------
Idaho	5	22	4	------	------	------	------	------	------	------	1
Wyoming	------	------	2	------	------	------	------	1	1	------	------
Colorado	36	32	32	------	------	------	------	2	------	------	1
New Mexico	48	21	16	------	------	------	------	------	------	------	------
Arizona	41	9	13	------	------	31	------	------	------	------	[7] 1
Utah [3]	16	16	53	------	------	------	------	------	------	------	3
Nevada	------	------	------	------	------	------	------	------	------	------	------
PACIFIC											
Washington	25	35	25	------	------	------	------	------	------	------	------
Oregon	27	24	21	------	------	------	------	------	------	------	------
California	386	75	357	6	4	------	2	------	1	------	4
Total	3,801	2,026	2,550	61	325	142	8	18	31	33	109
Same week, 1946	2,026	------	------	59	607	118	10	14	17	52	131
Median, 1942–46	2,550	------	------	32	382	114	8	10	17	52	[8] 125
20 weeks: 1947	55,715	------	------	952	5,861	3,955	135	46	621	749	[7] 2,102
1946	37,026	------	------	763	6,254	2,107	166	56	356	909	1,684
Median, 1942–46	49,852	------	------	595	4,875	1,432	166	56	344	909	[8] 1,722

[3] Period ended earlier than Saturday.

[7] Delayed reports: Undulant fever, Massachusetts, week ended Apr. 26, 3 cases; Arizona, month of April, 10 cases (figures included in cumulative total only).

[8] 2-year average, 1945–46. *Anthrax:* New York 1 case. *Leprosy:* Ohio 1 case.

WEEKLY REPORTS FROM CITIES [1]

City reports for week ended May 10, 1947

This table lists the reports from 88 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
New Hampshire:												
Concord	0	0	------	0	------	0	1	0	0	0	0	------
Vermont:												
Barre	0	0	------	0	2	0	0	0	0	0	0	1
Massachusetts:												
Boston	6	0	------	1	77	0	14	0	26	0	0	25
Fall River	0	0	------	0	49	0	1	0	4	0	0	7
Springfield	0	0	------	0	29	0	1	0	3	0	0	4
Worcester	0	0	------	0	11	0	3	0	2	0	0	7
Rhode Island:												
Providence	1	0	------	0	144	0	1	0	4	0	0	17
Connecticut:												
Bridgeport	0	0	------	0	32	0	3	0	5	0	0	2
Hartford	0	0	4	0	111	0	1	0	0	0	0	1
New Haven	0	0	------	0	58	0	0	0	7	0	0	9
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0	------	0	2	2	7	0	8	0	0	1
New York	13	0	1	0	366	1	66	0	97	0	3	87
Rochester	0	0	------	0	------	2	2	0	12	0	0	6
Syracuse	0	0	------	0	------	0	0	0	5	0	0	5
New Jersey:												
Camden	1	0	------	0	2	0	1	0	0	0	0	2
Newark	0	0	1	0	13	1	0	0	15	0	0	34
Trenton	1	0	------	0	8	0	3	0	1	0	0	1
Pennsylvania:												
Philadelphia	5	0	1	0	17	0	15	0	52	0	1	50
Pittsburgh	0	0	1	1	18	1	5	0	30	0	0	11
Reading	0	0	------	0	3	0	3	0	1	0	0	1
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	0	0	1	1	2	1	2	0	6	0	0	11
Cleveland	1	0	2	0	211	0	7	0	26	0	1	45
Columbus	2	1	------	0	117	0	0	0	9	0	0	15
Indiana:												
Fort Wayne	0	0	------	0	17	0	1	0	2	0	0	------
Indianapolis	0	0	------	0	2	2	1	0	6	0	0	25
South Bend	0	0	------	0	27	0	0	0	4	0	0	------
Terre Haute	0	0	------	0	2	0	0	0	0	0	0	1
Illinois:												
Chicago	0	0	------	0	10	5	18	0	31	0	0	29
Springfield	0	0	------	0	22	0	0	0	1	0	0	1
Michigan:												
Detroit	5	1	2	0	1	1	8	0	46	0	0	105
Flint	0	0	------	0	4	1	3	0	3	0	0	------
Grand Rapids	0	0	------	0	5	0	0	0	3	0	0	11
Wisconsin:												
Kenosha	0	0	------	0	1	0	0	0	0	0	0	2
Milwaukee	0	0	------	0	26	0	2	0	14	0	0	42
Racine	0	0	------	0	1	0	0	0	16	0	0	7
Superior	0	0	------	0	------	0	0	0	1	0	0	------
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0	------	0	------	0	0	0	2	0	0	4
Minneapolis	1	0	------	0	12	1	3	0	26	0	0	9
St. Paul	1	0	------	0	489	0	3	0	5	0	0	23
Missouri:												
Kansas City	1	0	------	0	------	2	10	0	9	0	0	9
St. Joseph	0	0	------	0	------	0	0	0	0	0	0	2
St. Louis	2	0	1	0	26	1	10	0	11	0	0	22

[1] In some instances the figures include nonresident cases.

City reports for week ended May 10, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
Nebraska:												
Omaha	1	0	------	0	5	0	0	0	3	0	0	------
Kansas:												
Topeka	0	0	------	0	------	0	0	0	5	0	0	2
Wichita	0	0	------	0	1	0	1	0	0	0	0	12
SOUTH ATLANTIC												
Delaware:												
Wilmington	1	0	------	0	1	0	2	0	2	0	0	------
Maryland:												
Baltimore	6	0	2	1	9	1	6	0	14	0	1	71
Cumberland	0	0	------	0	------	0	0	0	0	0	0	------
Frederick	0	0	------	0	------	0	0	0	0	0	0	------
District of Columbia:												
Washington	0	0	------	0	8	2	3	0	9	0	0	8
Virginia:												
Lynchburg	0	0	------	0	------	0	1	0	0	0	0	------
Richmond	0	0	------	0	70	0	1	0	4	0	0	3
Roanoke	0	0	------	0	38	0	0	0	2	0	0	------
West Virginia:												
Charleston	0	0	------	0	------	0	0	0	0	0	0	------
Wheeling	0	0	------	0	1	0	1	0	0	0	0	------
North Carolina:												
Raleigh	0	0	------	0	2	1	0	0	0	0	0	------
Wilmington	0	0	------	0	9	0	0	0	0	0	0	------
Winston-Salem	0	0	------	0	32	0	0	0	2	0	0	1
South Carolina:												
Charleston	0	1	4	0	38	0	3	0	1	0	0	------
Georgia:												
Atlanta	0	0	1	1	8	2	0	0	0	0	0	7
Brunswick	0	0	------	0	3	0	0	0	0	0	0	2
Savannah	0	0	------	0	3	0	0	0	0	0	0	------
Florida:												
Tampa	1	0	------	0	4	0	2	0	3	0	1	5
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	0	0	2	1	6	1	17	0	1	0	1	10
Nashville	0	0	------	0	------	0	3	0	2	0	0	4
Alabama:												
Birmingham	0	0	8	0	19	0	6	0	1	0	1	------
Mobile	0	0	------	0	21	0	0	1	0	0	0	12
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	------	0	------	0	0	0	0	0	0	6
Louisiana:												
New Orleans	1	0	5	------	15	1	------	1	0	0	0	7
Shreveport	0	0	------	0	------	0	5	0	0	0	0	------
Oklahoma:												
Oklahoma City	0	0	1	0	1	1	5	0	0	0	0	5
Texas:												
Dallas	3	0	2	2	188	1	0	0	4	0	0	6
Galveston	0	0	------	0	------	0	1	0	0	0	0	------
Houston	1	0	------	1	3	0	3	0	2	0	0	9
San Antonio	3	0	------	0	4	0	3	0	1	0	0	1
MOUNTAIN												
Montana:												
Billings	0	0	------	0	1	0	3	0	0	0	1	------
Great Falls	2	0	------	0	13	0	1	0	0	0	0	------
Helena	0	0	------	0	2	0	0	0	0	0	0	------
Missoula	0	0	------	0	25	0	0	0	0	0	0	------
Colorado:												
Denver	7	0	1	1	36	0	2	0	12	0	1	5
Pueblo	0	0	------	0	------	0	0	0	2	0	0	------
Utah:												
Salt Lake City	1	0	------	0	2	0	2	0	4	0	0	2

City reports for week ended May 10, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
PACIFIC												
Washington:												
Seattle	1	0	------	1	7	2	2	0	0	0	0	10
Spokane	0	0	------	0	7	0	2	0	0	0	0	------
Tacoma	0	0	------	0	1	0	0	0	2	0	0	2
California:												
Los Angeles	2	0	5	0	7	2	3	3	23	0	0	61
Sacramento	2	0	------	0	2	0	1	0	0	0	3	4
San Francisco	1	0	3	0	5	1	7	0	10	0	0	------
Total	73	3	48	[4] 11	2,514	36	[4] 281	5	602	0	14	889
Corresponding week, 1946*	68	------	30	12	9,561	------	285	------	1,092	0	9	438
Average 1942–46*	64	------	50	[2] 15	[3] 5,948	------	[2] 318	------	1,436	1	14	781

[2] 3-year average, 1944–46.
[3] 5-year median, 1942–46.
[4] Exclusive of New Orleans.

*Exclusive of Oklahoma City.
Dysentery, amebic.—Cases: New York 4; Chicago 2; Memphis 1; Nashville 1; New Orleans 1.
Dysentery, bacillary.—Cases: Chicago 1; Los Angeles 1.
Dysentery, unspecified.—Cases: Cincinnati 4; Baltimore 1; Houston 1; San Antonio 4.
Tularemia.—Cases: Springfield, Mass., 1; New Orleans 3.
Typhus fever, endemic.—Cases: Tampa 2; New Orleans 1.

Rates (annual basis) per 100,000 population, by geographic groups, for the 88 cities in the preceding table (latest available estimated population, 34,500,500)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza Case rates	Influenza Death rates	Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
New England	19.0	0.0	10.9	2.7	1,395	0.0	68.0	0.0	139	0.0	0.0	198
Middle Atlantic	9.3	0.0	1.9	0.5	199	3.2	47.2	0.0	102	0.0	1.9	92
East North Central	4.9	1.2	3.0	0.6	272	6.1	25.5	0.0	102	0.0	0.6	179
West North Central	12.1	0.0	2.0	0.0	1,072	8.0	54.3	0.0	123	0.0	0.0	167
South Atlantic	13.1	1.6	11.4	3.3	369	9.8	31.1	0.0	60	0.0	3.3	159
East South Central	0.0	0.0	59.0	5.9	271	5.9	153.5	5.9	24	0.0	11.8	153
West South Central	20.3	0.0	20.3	[4] 10.3	536	7.6	[4] 58.1	2.5	18	0.0	0.0	86
Mountain	82.6	0.0	8.3	8.3	653	0.0	66.1	0.0	149	0.0	16.5	58
Pacific	9.5	0.0	12.7	1.6	46	7.9	23.7	4.7	53	0.0	4.7	122
Total	11.1	0.5	7.3	[4] 1.7	381	5.5	[4] 43.2	0.8	91	0.0	2.1	135

[4] Exclusive of New Orleans.

SMALLPOX IN THE UNITED STATES

Of the 9 cases of smallpox reported in the United States during the week ended May 17, one was a fatal case in Fostoria, Ohio. This case was in a Mexican male, 73 years of age, who left Alice, Texas, on April 16 or 17, traveling by truck, and arrived in Fostoria on April 25. Diagnosis of smallpox was made on May 10, and death occurred 3 days

later. No secondary cases had been reported in Fostoria up to May 17.

Up to May 17 no cases had been reported in New York City or State since the week ended May 3, when 2 cases were reported in the city, bringing the total in the city to that date to 10 cases, with 2 deaths, and 4 cases up-State (in Millbrook).

The vaccination histories of the 12 cases reported in New York City and Millbrook during March and April show that 9 of the patients had never been vaccinated and 3 had been vaccinated not more recently than 40 years prior to attack.

TERRITORIES AND POSSESSIONS

Hawaii Territory

Plague (in ectoparasites).—Plague infection in a pool of 32 fleas, collected on March 20, 1947, from 59 rats (trapped), has been reported in District 3C, Kapulena area, Honokaa, Hamakua District, Island of Hawaii, T. H.

DEATHS DURING WEEK ENDED MAY 10, 1947

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended May 10, 1947	Corresponding week 1946
Data for 93 large cities of the United States:		
Total deaths	9, 190	9, 144
Median for 3 prior years	9, 144	
Total deaths, first 19 weeks of year	189, 114	187, 366
Deaths under 1 year of age	769	619
Median for 3 prior years	588	
Deaths under 1 year of age, first 19 weeks of year	15, 064	11, 605
Data from industrial insurance companies:		
Policies in force	67, 282, 120	67, 197, 338
Number of death claims	14, 611	12, 357
Death claims per 1,000 policies in force, annual rate	11. 3	9. 6
Death claims per 1,000 policies, first 19 weeks of year, annual rate	10. 1	10. 8

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended April 26, 1947.—During the week ended April 26, 1947, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		24		164	330	19	21	61	116	735
Diphtheria		3		26	3	1		1		34
German measles		1		36	45		1	1	6	90
Influenza		27			6	1			2	36
Measles		78	3	54	93	215	44	48	356	891
Meningitis, meningococcus				4		1			2	7
Mumps		20		62	51	48	163	19	241	604
Scarlet fever		2	6	58	75	5	1	10	4	161
Tuberculosis (all forms)		3	9	125	24	18	19	56	66	322
Typhoid and paratyphoid fever				6	4			1		11
Undulant fever					4			1	1	6
Venereal diseases:										
Gonorrhea	2	13	6	134	89	24	31	32	79	413
Syphilis	3	6	14	102	90	16	8	7	36	282
Other forms									2	2
Whooping cough			1	43	63	49	5	12	62	235

CUBA

Habana—Communicable diseases—4 weeks ended April 26, 1947.—During the 4 weeks ended April 26, 1947, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Chickenpox	15		Scarlet fever	1	
Diphtheria	13		Tuberculosis	11	4
Measles	12		Typhoid fever	15	

Provinces—Notifiable diseases—4 weeks ended April 26, 1947.—During the 4 weeks ended April 26, 1947, cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana [1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cerebrospinal meningitis				1			1
Cancer	5	10	12	11	4	21	63
Chickenpox		16	5	1	30	2	54
Diphtheria	1	14	2	2		2	21
Hookworm disease		38					38
Leprosy		5				2	7
Malaria	3				4	184	191
Measles		16	1	3	21	3	44
Poliomyelitis		1		1	2	2	6
Scarlet fever		1					1
Tuberculosis	27	48	57	55	24	40	251
Typhoid fever	24	39	3	37	10	26	139
Typhus fever (murine)		1				1	2
Whooping cough		20					20

[1] Includes the city of Habana.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

India—Calcutta.—For the week ended May 3, 1947, 232 cases of cholera, with 71 deaths, were reported in Calcutta, India.

Plague

Indochina (French)—Annam.—For the period April 21–30, 1947, 14 cases of plague, with 11 deaths, were reported in Annam, French Indochina.

Smallpox

China—Shanghai.—For the week ended April 26, 1947, 133 cases of smallpox were reported in Shanghai, China.

Colombia.—For the month of April 1947, 326 cases of smallpox, with 5 deaths, were reported in Colombia.

Ecuador.—For the month of April 1947, 50 cases of smallpox were reported in Ecuador.

Great Britain—England and Wales.—During the week ended May 10, 1947, 1 case of smallpox was reported in Coseley and 1 case in Sheffield, England.

India—Calcutta.—For the week ended May 3, 1947, 120 cases of smallpox, with 89 deaths, were reported in Calcutta, India.

Typhus Fever

Colombia.—For the month of April 1947, 130 cases of typhus fever, with 2 deaths, were reported in Colombia.

Ecuador.—For the month of April 1947, 51 cases of typhus fever, with 3 deaths, were reported in Ecuador.

Yugoslavia.—For the month of February 1947, 23 cases of typhus fever, with 4 deaths, were reported in Yugoslavia.

Yellow Fever

Colombia.—Yellow fever has been reported in Colombia as follows: Caldas Department—La Dorado, January 1–31, 1947, 1 death; La Dorado, Barroblanco, March 12, 1947, 1 death; Santander Department—Simacota, January 1–31, 1947, 3 deaths.

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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AGGLUTINATION AND AN AGGLUTININ-"BLOCKING" PROPERTY IN SERUMS FROM KNOWN CASES OF BRUCELLOSIS[1]

By JAMES J. GRIFFITTS, *Surgeon, United States Public Health Service*

The variability of agglutination reactions in certain infectious diseases is well known. In some respects the failure of certain human cases of bacterial infection to exhibit agglutinins is analogous to the earlier serological findings in serums of Rh-negative mothers who had been delivered of infants with *erythroblastosis fetalis.* Although the disease process was evident, agglutinins for Rh-positive red blood cells could not be demonstrated in approximately one-half the mothers whose infants were so affected (*1, 2*). These tests were performed using saline suspensions of Rh-positive red cells. In 1944, Wiener (*3*) and Race (*4*) described an agglutinin-"blocking" phenomenon in serums of individuals sensitized to Rh factor but lacking agglutinins in the usual tests with red cells suspended in physiological salt solution. This phenomenon appeared to depend upon the combination of Rh antigen with a so-called "blocking or incomplete" antibody which rendered the cells insensitive to the later addition of known anti-Rh agglutinins.

Later, Diamond (*5*) demonstrated the presence of Rh-antibodies in over 99 percent of sensitized mothers by testing the serums with whole blood suspensions of Rh-positive cells on a glass slide. Soon thereafter (*6*) it was shown that the so-called blocking antibody agglutinated Rh-positive red cells in the presence of sufficient serum, plasma, albumin, and more recently other colloidal reagents (*7*).

It is believed that the phenomena observed in Rh sensitization are immunological responses though adequate understanding of them is still lacking. If this theory is correct it should be possible to demonstrate similar phenomena in human infectious disease. The ability

[1] From the Biologics Control Laboratory, National Institute of Health.

of the serums of individuals infected with *Brucella* to agglutinate this organism is known to be variable. For example, it is not unusual to find, in cases wherein the disease process continues, that agglutinins fail to appear in significant titer at any time, or, having been once present, the agglutinins disappear. The absence of agglutinins in instances of apparently active disease is not well explained. It is the purpose of this report to record observations of agglutination and agglutinin-blocking phenomena in serums of persons known to have had brucellosis.

EXPERIMENTAL WORK

Brief histories of the individuals from whom serums were drawn are given in table 1. The individuals with positive histories became infected with *Brucella* in the course of laboratory or field investigations. All had apparently recovered from the disease with the possible exceptions of WA, RC, and FR, who still had occasional recurrence of headaches and muscle aches, at the time this experiment was undertaken. The individuals with negative histories of brucellosis were selected for the probable reliability of their medical histories.

Source of serums.—Blood was obtained by venipuncture, the serum separated, and stored at −18° C. or lower. Small portions were removed on each day of testing after thawing the serum, and the remainder was again stored in the frozen state.

Agglutination titrations.—The routine test for detection of agglutinins for *Brucella* organisms was performed on all serums in the following manner: A formalized saline suspension of *Brucella abortus*, N.I.H. strain 456, was adjusted to a turbidity equal to approximately 500 P. P. M. of silica standard. This antigen was added in equal parts to serum diluted 1:5, 1:10, 1:20, to 1:1280. The tubes containing the serum-dilution-antigen mixtures were shaken and placed in a water bath at 37° C. for 2 hours. The tubes were then removed and placed overnight in an ice box at 5° C. The reactions were read by the degree of clearing of the supernatant liquid. Readings of 1:10 to 1:20 (complete or incomplete agglutination) are not uncommon in serums of normal individuals.

A modification of this procedure was devised by using the same antigen diluted about three times further than in the routine tests above. This antigen was added to tubes containing serum undiluted, and serums diluted 1:2, 1:4, 1:8, etc. The tubes were incubated in a warm room at 37° C. for 1 hour, agitated for 10 minutes on a Boerner rotating machine, and examined macroscopically, with a strong light source, for agglutination. Considering the insignificance attached to 1:10 and 1:20 readings in the routine test, the results obtained by the two methods were consistent (see table 5). The organisms were

TABLE 1.—*Summary of histories of brucellosis in individuals whose serums were examined*

Individual	Date of onset	Duration of syptoms	Blood culture	Skin test	Date of highest known agglutination	Infection: Type	Infection: Source	Remarks
POSITIVE HISTORY OF BRUCELLOSIS								
AE	October 1922	Over 10 years	+	Unknown	1923—1 : 40	Melitensis	Laboratory	Chronic symptoms; low or absent agglutinins. Vaccine treatment.
BS	Spring 1923	Several years	Unknown	do	1923—1 : 5,120	do	do	Recurrent attacks.
AC	January 1928	3½ years	+	+to suis antigen	Unknown	Suis	do	Positive stool cultures.
EF	November 1928	5 months	+	Unknown	Over 1 : 1,000	Melitensis	do	Typical symptoms.
CM	February 1934	4 months	Unknown	Negative	1937—1 : 100	Abortus	Field or laboratory.	Possible recurrence 1936. Works with virulent organisms.
CG	do	5 months	do	Slight	1934—1 : 640	do	Field	Treatment with "Brucellin."
EE	April 1938	3 weeks	do	Unknown	1938 report 1 : 100,000	do	Laboratory	Accidental conjunctival infection. Rapid recovery.
MA	January 1939	4 months	+	1939 negative	1944—1 : 200	Melitensis	do	Works with virulent organisms.
LG	May 1939	5 months	+	Unknown	1939—1 : 500	Abortus	Field	"Brucellin" treatment.
FR	June 1942	Over 3 years	Unknown	1942: Positive; 1943: Negative	Unknown	Unknown	Unknown	Vaccine treatment over 3-year period.
WA	February 1944	8 months	Negative	Unknown	1944—1 : 200	Abortus	Laboratory	Occasional muscle pains and headaches continue.
RO	August 1944	6 months	Unknown	do	1944—1 : 3,200	do	Field	Works with virulent organisms.
L	(?)	Several years	do	do	3-4 years ago—1 : 600	do	Laboratory	Vague history. Works with virulent organisms.
BP	June 1946	2 months	do	do	1946—1 . 1,280	Melitensis	do	Apparent recovery.

NEGATIVE HISTORY OF BRUCELLOSIS

JG	Undiagnosed illness 1923, lasting 3 months; otherwise nothing suspicious.	
VP	Undiagnosed illness 1946 of 10 days duration; otherwise not suspicious for brucellosis.	
JS	No history of brucellosis.	
KH	Do.	
TP	No history of brucellosis.	Known pulmonary tuberculosis.
CL	No history of brucellosis.	History of tularemia.
GL	No history of brucellosis.	Worked as dairyman 10-12 years ago.
VO	No history of brucellosis.	
MV	Do.	
RH	Do.	

distinctly agglutinated by certain serums, and since no period of sedimentation was allowed, the degree of clearing of the suspending medium was disregarded.

Agglutinin-"blocking" phenomenon.—Using the more rapid test method, tubes were examined for agglutination at 1 and 2 hours' incubation. At the end of 1 hour, to each tube of one set of duplicate serum-dilution-antigen mixtures was added one drop of serum containing agglutinins in such dilution that organisms in the saline control tubes would be distinctly agglutinated after further incubation of 1 hour and the usual shaking. All tubes were then re-examined for the presence or absence of agglutination.

It was apparent that serums freshly drawn from individuals with histories of brucellosis prevented or weakened (as compared with the agglutination in saline controls) the action of known agglutinin on *Brucella* organisms. It was also noted that serum freshly drawn from individuals without histories of brucellosis prevented the action of added agglutinin to a somewhat lesser degree. The tests were repeated using *Br. abortus* 428 with consistent results. Table 2 illustrates the results of tests with certain serums selected to show

TABLE 2.—*Agglutinin titrations and the "blocking" effect of serums when known agglutinin is added to serum and* Brucella *antigen mixtures*

Serum	Test	Dilutions of serum in saline									Control antigen and saline
		1:2	1:4	1:8	1:16	1:32	1:64	1:128	1:256	1:512	
		Positive history of brucellosis									
AE	Agglutinins	—	—	—	—	—	—	—	—	—	—
	"Blocking"	—	—	—	W	+	+	+	+	+	+
JC	Agglutinins	—	—	—	—	—	—	—	—	—	—
	"Blocking"	—	—	—	—	W	+	+	+	+	+
MA	Agglutinins	W	—	—	—	—	+	—	—	—	—
	"Blocking"	W	—	—	—	—	+	+	+	+	+
RC	Agglutinins	W	—	—	—	—	W	W	—	—	—
	"Blocking"	W	—	—	—	—	+	+	+	+	+
OM	Agglutinins	W	—	—	—	—	—	—	—	—	—
	"Blocking"	W	—	—	—	—	—	W	W	+	+
L	Agglutinins	W	—	—	—	—	—	—	—	—	—
	"Blocking"	W	—	—	—	—	—	W	+	+	+
BP	Agglutinins	W	—	—	—	W	+	+	+	—	—
	"Blocking"	+	—	—	—	+	+	+	+	+	+
		Negative history of brucellosis									
JG	Agglutinins	—	—	—	—	—	—	—	—	—	—
	"Blocking"	—	—	W	+	+	+	+	+	+	+
VP	Agglutinins	—	—	—	—	—	—	—	—	—	—
	"Blocking"	W	+	+	+	+	+	+	+	+	+
KH	Agglutinins	—	—	—	—	—	—	—	—	—	—
	"Blocking"	—	—	W	+	+	+	+	+	+	+
TP	Agglutinins	—	—	—	—	—	—	—	—	—	—
	"Blocking"	—	W	+	+	+	+	+	+	+	+

Titrations were set up in duplicate. In the "blocking" test the diluted serum of BP was added to each tube so that final dilution of this agglutinating serum was 1:91 in each tube. Agglutinins were added at end of 1 hour's incubation. All tubes were incubated 1 hour more, shaken 10 minutes, and read for agglutination.

Antigen=*Brucella melitensis* N. I. H. strain 428.

W=Agglutination weaker than in saline control.

differences in individual serums. The results of all serums are given in the summary in table 5.

Normal serums have not shown complete or partial blocking when diluted beyond 1:32, while serums from cases with a history of brucellosis blocked agglutination from 1:16 to 1:256.

The agglutinating serum used, BP, showed a "zone phenomenon" in which agglutination was weak or absent in serum dilution 1:2 to 1:32 (table 2). It is of interest to note that the antigen was not agglutinated by the addition of known agglutinin, a finding which Diamond (*2*) and Levine (*8*) have observed in tests with certain anti-Rh serums. They suggest that such findings are due to the presence of agglutinins and blocking antibodies in the same serum, the agglutinins becoming effective as the lower-titering but avid blocking antibodies are increasingly diluted. Serums MA and RC showed a similar blocking action although agglutinins were demonstrable at greater dilutions of serum.

Since tests with serums of normal individuals stored for several months did not (in contrast to the freshly drawn serums) show an agglutinin blocking effect, fresh serums of normal individuals and of those with brucellosis histories were heated at 56° C. for 15 minutes. The effect of such heating was to remove the agglutinin-blocking property from serums of normal individuals, from some of those with positive histories, and to reduce this blocking action in serums of others with positive histories. Table 3 illustrates the effect of heating on the blocking property of certain serums.

Serum EF showed little blocking action after heating, and when diluted 1:4 failed to prevent the effect of added agglutinin. However, serum CM after heating showed blocking equal to the relatively high titer noted with unheated serum. Serum MA is included in table 3 to illustrate the effect of heating on a serum which contains agglutinins and exhibits blocking action as well. This serum unheated showed agglutination only in the 1 : 64 dilution. whereas after being heated agglutination was noted in serum dilutions 1 : 16, 1 : 32, and 1 : 64. A similar effect was noted with serum RC.

This would suggest lability of the blocking property of serums, a finding which may account for the observation that further storage of these serums at room temperature and at 5° C. has led to the demonstration of low-titered agglutinins (1 : 8–1 : 64) in almost all of the serums of those having histories of brucellosis.

Table 5 includes the results of agglutinin-blocking tests with all serums. Serums EF, AE, and EE before and after heating had relatively low titers. Serums CM and L had relatively high blocking titers. Between these two groups were the reactions of the other serums.

TABLE 3.—*Agglutinin titrations and tests for "blocking" effect of serums using freshly drawn unheated and heated serums*

Serum	State of serum	Test	Serum dilutions in saline								Control antigen and saline
			1:4	1:8	1:16	1:32	1:64	1:128	1:256	1:512	
			Positive history of brucellosis								
EF	Unheated	Agglutinins	−	−	−	−	−	−	−	−	−
		"Blocking"	−	−	−	W	+	+	+	+	+
	Heated	Agglutinins	−	−	−	−	−	−	−	−	−
		"Blocking"	W	+	+	+	+	+	+	+	+
MA	Unheated	Agglutinins	−	−	−	−	+	−	−	−	−
		"Blocking"	−	−	−	−	+	+	+	+	+
	Heated	Agglutinins	−	−	W	W	+	−	−	−	−
		"Blocking"	−	−	W	+	+	+	+	+	+
CM	Unheated	Agglutinins	−	−	−	−	−	−	−	−	−
		"Blocking"	−	−	−	−	W	W	+	+	+
	Heated	Agglutinins	−	−	−	−	−	−	−	−	−
		"Blocking"	−	−	−	−	−	W	+	+	+
			Negative history of brucellosis								
JG	Unheated	Agglutinins	−	−	−	−	−	−	−	−	−
		"Blocking"	−	−	W	+	+	+	+	+	+
	Heated	Agglutinins	−	−	−	−	−	−	−	−	−
		"Blocking"	+	+	+	+	+	+	+	+	+
JS	Unheated	Agglutinins	−	−	−	−	−	−	−	−	−
		"Blocking"	−	W	+	+	+	+	+	+	+
	Heated	Agglutinins	−	−	−	−	−	−	−	−	−
		"Blocking"	+	+	+	+	+	+	+	+	+

Titrations of serums were set up in duplicate. In the "blocking" test the diluted serum of BP was added so that the final dilution of this agglutinating serum was 1:91 in each tube. The agglutinin was added at the end of 1 hour's incubation. All tubes were incubated 1 hour more, shaken 10 minutes, and read for agglutination.

Antigen = *Brucella melitensis* N. I. H. strain 428.

W = Agglutination weaker than in saline control.

Agglutination titrations using serum as the diluting medium.—Following the demonstration of an agglutinin-blocking phenomenon, the possibility of demonstrating agglutinins by other techniques used in testing serums for Rh-antibodies of the blocking type was investigated. One such method employs the serial dilution of serum to be examined in a "neutral" serum, plasma, or albumin solution. The antigen also is suspended in a protein-containing medium. Under such conditions reactions may be shown with Rh positive red blood cells, although the serum when titrated in a saline diluent would fail to react with Rh positive cells.

Serums were diluted serially with human pooled plasma or serum, normal rabbit serum, and with albumin solutions. The latter in the proportions used were not satisfactory, and investigations are continuing to adapt this material to the test. In the tests described below serums from 10 normal rabbits were pooled. On mixing this serum with human serum a precipitate was noted which was removed by adding human pooled plasma and centrifuging the mixture after 1 hour's incubation. The supernatant serum gave no precipitate and did not agglutinate *Brucella* organisms.

The serums tested were diluted in serial twofold dilutions; the rabbit serum described above was used as a diluent. The cells of a heavy saline suspension of *Brucella melitensis* 428 were packed by centrifuging, and a suspension equal to 0.5 percent by volume of bacterial cells in rabbit serum was prepared. Equal parts of this suspension were added to serum dilutions; the tubes were incubated for 1 hour at 35° C.; shaken for 10 minutes on the rotating machine, and examined for agglutination. An illustrative protocol is shown in table 4.

TABLE 4.—*Agglutinin titrations of serums using saline and rabbit serum as a diluent*

Serum	Diluent	Serum dilutions								
		1:4	1:8	1:16	1:32	1:64	1:128	1:256	1:512	1:1024
		Positive history of brucellosis								
CM	Saline	—	—	—	—	—	—	—	—	—
	Absorbed rabbit serum	+	+	+	+	+	+	—	—	—
L	Saline	—	—	—	—	—	—	—	—	—
	Absorbed rabbit serum	+	+	+	+	+	+	+	—	—
		Negative history of brucellosis								
JS	Saline	—	—	—	—	—	—	—	—	—
	Absorbed rabbit serum	—	—	—	—	—	—	—	—	—
KH	Saline	—	—	—	—	—	—	—	—	—
	Absorbed rabbit serum	—	—	—	—	—	—	—	—	—

Brucella melitensis N. I. H. strain 428 as the antigen.
Tubes incubated 1 hour, then shaken 10 minutes.

Serums of all individuals gave as high or higher agglutinin titers in serum diluent than in saline. This was noted with serums showing no agglutination in saline (EF, BS, and AC) as well as serums MA, RC, and BP which had agglutinins operative in saline medium (table 5). Serums of individuals with negative histories of brucellosis did not agglutinate organisms in the presence of the rabbit serum above a serum dilution of 1:8.

The character of the aggregates in the serum medium differed from the clumps in saline in that the masses were more fragile and tended to be readily dispersed on vigorous shaking. The reactions obtained with serums CM and L in the presence of rabbit serum represent a marked increase over the titer in saline medium.

Individuals from whom serums CM, L, RC, and MA were obtained, continue to work actively with the organisms in the field and laboratory. The others have had little or no deliberate contact with *Brucella*.

The finding that reactions occurred in the presence of serum may account for the occurrence of agglutination in certain serums when the undiluted serum is combined with antigen, as shown in table 2.

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Serums MA, RC, CM, L, and BP show weak agglutination when mixed with an equal volume of saline-suspended antigen.

Reactions with serum and antigen on glass plates.—The mixture of a whole-blood suspension of Rh-positive cells on a heated glass plate with a serum from a sensitized individual is a reliable method of testing for Rh sensitization. The degree of reaction depends in part at least upon the presence of abundant antigen, sufficient protein (serum, plasma, or albumin), the heat of the glass plate, and agitation of the mixture.

Heavy suspensions of *Brucella* organisms suspended in saline are used extensively in the diagnosis of brucellosis in cattle and in man (*9*, *10*). This antigen is usually treated with steam and often has gelatin added to promote the sensitiveness of the antigen. Several of the serums examined had been titered with such antigen and had given reactions which had been interpreted as negative.

Heavy suspensions of formalin-killed *Brucella melitensis* (N. I. H. strains 428 and 2705 [2]) in saline were centrifuged and the packed cells resuspended in normal saline and in rabbit serum to make 10 to 20-percent suspensions of *Brucella* organisms. After thorough mixing the antigen was placed on a clear glass plate. An equal amount of undiluted serum was placed on the plate, mixed with the antigen, and spread over an area about 25 to 30 mm. in diameter. The glass plate was held in a viewing box having a dark background and a light source which also heated the plate to approximately 50° C. The box was tilted back and forth to agitate the mixtures.

Clear-cut agglutination reactions resulted in 5 to 15 seconds with serums which contained agglutinins demonstrable in tubes using saline as a medium (serums MA, BP, and RC). These serums agglutinated antigen suspended in saline or serum. Serums from other cases with positive histories gave plate reactions only with organisms suspended in rabbit serum. The time of beginning agglutination with these serums was within 90 seconds (see last column of table 5).

As evaporation of liquid from the mixture proceeded, false clumping was noted in almost all serums examined on the plate. The addition of a drop or two of saline to the serum-antigen mixtures after 2 minutes caused the disappearance of clumping in serums of individuals with no histories of brucellosis but did not weaken the clumping in serums of individuals with positive histories. A time limit of 2 minutes for reading the reaction reduced the occurrence of false positive reactions.

It was noted that the reactions on the glass plate when *Brucella*

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[2] N. I. H. strain 2705 was isolated recently from human blood by Doctor C. L. Larson, National Institute of Health.

TABLE 5.—*Summary of agglutination and agglutinin "blocking" reactions in serums*

Serum	Agglutinin titer			Agglutinin-"blocking" titer				Plate test	
	Saline diluent		Serum diluent	Serum before heating		Serum after heating		Clumping of antigen	
	Routine	Modified		Complete	Partial	Complete	Partial	Saline	Serum
POSITIVE HISTORY OF BRUCELLOSIS									
AE	1:20	Negative 1:2	1:32	1:8	1:16	None 1:4	1:4	None	Weak.
EF	Negative 1:10	do	1:32	1:16	1:32	do	1:4	do	Do.
BS	do	do	1:64	1:16	1:32	1:16	1:32	do	Do.
AC	do	do	1:32	1:32		1:8	1:32	do	Do.
CM	1:10	1:2	1:256	1:64	1:128	1:64	1:128	do	Strong.
CG	Negative 1:10	1:2	1:32	1:8	1:64	None 1:4	1:16	do	Moderate.
EE	do	1:2	1:8	1:4	1:32	do	1:4	do	Weak.
MA	1:40	1:64	1:128	1:32		1:16	1:32	Strong	Strong.
LG	1:20	1:2	1:32	1:16	1:64	1:4	1:16	None	Moderate.
FR	1:20	Negative 1:2	1:32	1:32	1:128	1:16	1:32	do	Strong.
WA	1:20	do	1:32	1:32	1:128	1:8	1:16	do	Moderate.
RC	1:80	1:128	1:128	1:32		1:16		Strong	Strong.
L	1:10	1:2	1:256	1:64	1:256	1:32	1:64	None	Do.
BP	1:320	1:256	1:512	1:16		Not done		Strong	Do.
NEGATIVE HISTORY OF BRUCELLOSIS									
JG	1:10	Negative 1:2	1:8	1:8	1:16	None 1:4	None 1:4	None	None.
VP	Negative 1:10	do	Negative 1:4	None 1:4	1:4	do	do	do	Do.
JS	1:20	do	do	1:4	1:8	do	do	do	Do.
KH	1:20	do	do	1:8	1:16	do	do	do	Do.
TP	1:10	do	do	None 1:4	1:4	do	do	do	Do.
CL*	1:20	do	do	do	None 1:4	do	do	do	Do.
GL*	Negative 1:10	do	do	do	do	do	do	do	Do.
JO*	do	do	do	do	do	do	do	do	Do.
MV*	do	do	do	do	do	do	do	do	Do.
RH*	1:20	do	1:8	do	do	do	do	do	Do.

Antigen for agglutinin titrations in saline and in serum=*Brucella abortus* N.I.H. strain 456. Antigen used in agglutinin-"blocking" test=*Brucella melitensis* N.I.H. strain 428. Antigen for "plate" test=*Brucella melitensis* NIH strain 2705. Values shown on routine tests are the highest dilutions of serum causing partial agglutination.
*—These serums had been stored at *minus* 18° C. for several months.

melitensis N. I. H. strain 2705 was used were more distinct than when either *Brucella melitensis* N. I. H. strain 428 or *Brucella abortus* N. I. H. strain 456 was used.

It was also found that the addition of 30 percent albumin (human or bovine) solution in equal parts with heavy saline suspensions of *Brucella* gave excellent results with serums in plate tests.

DISCUSSION

The observations presented seem to parallel those reported in tests for Rh sensitization. The finding that agglutinin-blocking substance is present in serum of certain individuals who have had brucellosis may account, in part, for the absence of agglutination in saline systems of testing. The results obtained by using heavy suspensions of *Brucella* organisms in serum or albumin on a warmed glass plate were distinct and indicate that this method may be useful as a screening test in examining serums for evidence of sensitization to *Brucella.*

CONCLUSIONS

1. Serums freshly drawn from individuals known to have been infected with *Brucella* have the property of "blocking" the agglutination of *Brucella* organisms in a saline medium. This property is present to a lesser degree in freshly drawn normal serum.
2. This agglutinin-blocking property appears to be labile, as it disappears from normal serums on heating (56° C. for 15 minutes) and is reduced in effectiveness in the serums of persons who have had brucellosis.
3. Serums shown to have agglutinin-blocking properties agglutinate *Brucella* organisms when rabbit serum is used in place of physiological saline as a diluent for titrations and as a suspending medium for *Brucella* organisms.
4. Serums from certain individuals known to have had brucellosis agglutinate heavy suspensions (10 to 20 percent by volume) of *Brucella* organisms suspended in serum or albumin solution on a warmed glass plate, though agglutination titrations in test tubes with saline may be negative.

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NOTE.—The recently reported work of Morgan and Shütze (*11*) using anti-human-globulin rabbit serum to demonstrate "nonagglutinating" antibodies in the serums of vaccinated individuals was noticed after the observations presented here were completed. No blocking properties were found in serums by their methods.

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A STUDY OF MURINE TYPHUS FEVER IN COFFEE COUNTY, ALABAMA [1]

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INTRODUCTION

Murine typhus fever has long been a problem in the southern United States. Although cases were diagnosed as early as 1913, considerable numbers were not reported until after 1926 when rodents were first implicated in the transmission of the disease to humans (*1*). In 1935 there were 1,287 cases, whereas in 1944 there were 5,337 cases (*2*) officially reported in the United States.

In November of 1943, a combined typhus control and typhus investigation program was begun in Coffee County, Alabama, with the United States Public Health Service, Alabama State Health Department, and the County Health Department cooperating. This study area was selected because of its consistently high reported incidence of typhus fever over the past several years and because the population is predominantly rural, affording an opportunity to study the feasibility of rural typhus control.

Coffee County lies between 31° and 32° north latitude, and 86° west longitude passes through its center. The terrain is hilly. The red clay and sandy soil has been subjected to considerable erosion. The

[1] From States Relations Division, Bureau of State Services.

principal crops are peanuts, corn, and cotton. There is also a minor pulpwood industry derived from the natural pine growth throughout the county. Several years ago the boll weevil caused many of the farmers to discontinue growing cotton and to embark upon peanut production. There are rather poor housing and crop storage facilities throughout the county. Most of the existing structures could not be ratproofed economically enough to warrant such a procedure. Typhus in this county is representative of the occurrence of murine typhus fever in those areas from which the large majority of cases are reported each year in the United States.

Typhus control operations included a limited amount of ratproofing in some of the towns and extensive use of various rat eradication procedures throughout the county. Trapping operations were conducted for the purposes of obtaining rat blood specimens for serological study and for securing information concerning the ectoparasites of rats. Within a 9-month period, at least two visits were made to each farm in the area.

At the same time that rat eradication and trapping activities were being carried out, a door-to-door survey was made to locate individuals with a history of having had typhus fever during 1943. Although only 61 cases of typhus fever were officially reported, 211 persons said they had had the disease. Wherever a reputed case of typhus fever was found, a follow-up visit was made by a physician or a nurse. Blood specimens were obtained on 177 of the 211 reputed cases. Two of the 34 remaining cases had died from typhus; 2 refused to give a blood specimen; 29 could not be located; and one attempt at vena puncture was unsuccessful.

HUMAN CASE STUDIES

Laboratory tests were considered confirmatory if the typhus complement-fixation test was positive in a 1:16 dilution or higher or if the proteus X–19 agglutination test yielded a titer of 2 plus in a 1:160 dilution or higher. There were two cases, considered confirmed, which gave clinical histories of typhus fever and the following serological results:

1. Specimen 160 on E. B. drawn 12 months after his illness:
   - 1 plus in 1:4 dilution of typhus complement-fixation test. (NIH and Alabama)
   - 2 plus in 1:80 dilution of proteus X–19 agglutination test. (NIH)
   - 1 plus in 1:80 dilution of proteus X–19 agglutination test. (Alabama)
2. Specimen 194 on S. P. drawn 15 months after his illness:
   - 1 plus in 1:4 dilution of typhus complement-fixation test. (NIH and Alabama)
   - 1 plus in 1:40 dilution of proteus X–19 agglutination test. (NIH)

Of the 177 individuals from whom blood specimens were obtained, 115 gave positive typhus complement-fixation tests; 18 gave positive

proteus X–19 agglutination tests without the complement-fixation tests being done; 2 had positive proteus X–19 agglutination tests and negative complement-fixation tests. There were two additional cases which terminated fatally without laboratory confirmation, making a total of 137 cases which were considered as positive. (See table 1.) Assuming that the same ratio of positivity would exist among the 32 who were not examined, it may be estimated that 160 of the 211 individuals giving a history of typhus fever were actually ill with this disease during 1943. Consequently, the 1943 estimated morbidity rate for murine typhus fever in Coffee County was 500 per 100,000 population.

Among the 42 specimens giving negative serological findings for typhus, there were 16 with agglutinations with proteus X–19 in dilutions less than 1:80, whereas the complement-fixation tests on these specimens were negative. Of the 211 alleged cases of typhus fever, 76 percent were confirmable by laboratory tests. On the other hand, only 61 cases were actually reported, representing 44 percent of the 137 known positive cases.

TABLE 1.—*Confirmation studies on 211 reputed cases of murine typhus fever*

	Positive[1]	Negative[2]	Unknown[3]	Total
Number of cases	137	42	32	211

[1] Includes:
- (1) Positive complement-fixation and Weil-Felix — 100
- (2) Positive Weil-Felix with no complement-fixation test done — 18
- (3) Positive complement-fixation with negative Weil-Felix — 15
- (4) Negative complement-fixation with Weil-Felix 2 : 160 or higher — 2
- (5) Deaths reported as due to typhus — 2

[2] Includes:
- (1) Negative complement-fixation and a Weil-Felix less than 1 : 80 — 16
- (2) Negative complement-fixation and negative Weil-Felix — 22
- (3) Negative Weil-Felix and no complement-fixation test done — 4

[3] Includes all cases on which blood specimens were not obtained, excluding the two fatalities.

(Acknowledgement: Serological tests were run by the Alabama State Health Department Laboratory and by the U. S. Public Health Service laboratories at the National Institute of Health.)

Distribution of the 137 confirmed cases into 5- or 10-year age groups results in numbers which are too small to justify comparison of such groups. This is particularly true since the 1940 census, the only available base line for these comparisons, is inaccurate in those age groups which have been affected by military service. However, the difference in morbidity rates for those under 30 years of age as compared with those 30 and over is statistically significant and can probably be explained by differences in daily activities. (See table 2.) Also, the difference in male and female morbidity rates is probably caused by the greater occupational exposure of males. Although only 8 percent of the established cases are among Negroes, 20.5 percent of the population is made up of Negroes. This apparent discrepancy is

probably caused by a combination of the factors which result in the poorer reporting of all diseases among Negroes. (See table 2.)

TABLE 2.—*Incidence of confirmed typhus fever by age, sex, and race for 1943, based on the 1940 census*

	1940 census				Confirmed typhus cases—1943					Rate per 100,000
	White		Colored		White		Colored		Total	
	Male	Female	Male	Female	Male	Female	Male	Female		
Age:										
Under 30	8,177	8,128	2,193	2,263	31	18	3	0	52	250.47
30 and over	4,546	4,577	1,023	1,080	43	29	5	3	80	712.63
Unspecified					5				5	
Total	12,723	12,705	3,216	3,343	79	47	8	3	137	428.3

Based upon the 137 confirmed cases of typhus fever arranged by month of occurrence, two peaks of typhus incidence appear in 1943, one in July and the other in October. A similar tendency toward two peaks of incidence is seen when cases officially reported during the period from 1942 through 1944 are arranged by months in which the cases are reported. (See tables 3 and 4.) The numbers of cases involved are too small to establish proof of significance in themselves. However, the consistent occurrence of this phenomenon is of interest and may be related to the fact that in late summer grain crops are harvested and stored in granaries and cribs and later in the fall peanuts are thrashed. Both of these activities involve dusty occupations in places which are usually heavily infested with rats.

TABLE 3.—*Distribution of 135 confirmed cases of typhus fever by months of onset in 1943*

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Typhus cases	3	3	2	4	10	10	23	9	17	23	19	12

NOTE.—Month of onset was not determined in 2 other cases.

TABLE 4.—*Consolidated monthly reporting of typus fever for 1942, 1943, and 1944 by month of reporting*

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Typhus cases	5	4	2	2	5	5	23	26	13	9	28	15

The probability of acquiring typhus fever in Coffee County, Alabama, appears to be about the same for rural and urban residents. (See table 5.) No attempt was made to trace the source of each case because of the lapse of several months from the time of illness to the time of getting a history.

TABLE 5.—*Distribution of 1943 typhus cases by place of residence*

Residence	1940 census		Serological confirmation				
	Population	Percent	Confirmed		Not confirmed	Not examined	Total
			Number	Percent			
Residence in town	4,353	13.6	22	16	4	3	29
Residence on farm	27,634	86.4	115	84	38	29	182
Total	31,987	100.0	[1] 137	100	42	32	211

[1] Two of these cases terminated fatally.

RODENT RESERVOIR STUDIES

A study of rodent serology throughout the county indicates that typhus infection of rodents is quite widespread. History of human cases frequently points to exposure during grain-harvesting or peanut-threshing seasons.

Of 430 rat bloods collected on farms, 42 percent gave positive complement-fixation tests. (See table 6.) Fifty-three percent of 261 farms yielded one or more rats with a positive reaction. (See table 7.)

TABLE 6.—*Complement-fixation tests of rat blood specimens collected from rats trapped on farms, March–July, 1944*

	R. norvegicus			*R. rattus*			Total rats		
	Number negative	Number positive	Percent positive	Number negative	Number positive	Percent positive	Number negative	Number positive	Percent positive
Month:									
March	14	12	46	17	6	26	31	18	37
April	32	32	50	11	22	67	43	54	56
May	42	14	25	12	18	60	54	32	37
June	22	15	40	19	22	54	41	37	47
July	18	9	33	60	33	35	78	42	35
Total	128	82	39	119	101	46	$\underbrace{247 \quad 183}_{430}$		42

TABLE 7.—*Degree of farm infection as determined by complement-fixation reaction of rat blood specimens collected*

	R. norvegicus			*R. rattus*			*R. rattus* and *R. norvegicus*			Total rats		
	Farms negative	Farms positive	Percent positive	Farms negative	Farms positive	Percent positive	Farms negative	Farms positive	Percent positive	Farms positive	Farms negative	Percent positive
Month:												
March	7	7	50	6	3	33	1	6	86	14	16	53
April	11	19	63	4	15	79	0	2	100	15	36	70
May	25	12	44	7	15	68				32	27	46
June	13	11	46	11	18	62				24	29	55
July	7	5	42	31	23	42	0	2	100	38	30	44
Total	63	54	46	59	74	56	1	10	91	$\underbrace{123 \quad 138}_{261}$		53

As indicated in table 8, the success in demonstrating infection varies directly with the number of rats tested per farm. Both species of domestic rats (*Rattus rattus* and *Rattus norvegicus*) were found in this county in about equal numbers, and, in conformity with other experience, it was uncommon to trap the two species on the same farm. (See table 7.)

TABLE 8.—*Variability of degree of farm infection when 1, 2, 3, 4, or 5 rats were tested per farm*

Number of rat blood specimens per farm	Number of farms negative	Number of farms positive	Percent of farms positive
1	88	54	38
2	24	54	69
3	11	24	69
4	0	4	100
5	0	2	100
Total	123	138	53
	261		

RODENT ECTOPARASITE STUDIES

The following species of ectoparasites were collected: *Xenopsylla cheopis, Echidnophaga gallinacea, Leptopsylla segnis, Echinolaelaps echidninus, Liponyssus bacoti, Polyplax spinulosa.* A few other species of ectoparasites were present in insignificant numbers.

The series of rats on which both serological and ectoparasite studies were made was too small to justify a break-down by combinations of ectoparasites. However, a study of the association of serological results with the presence or absence of *Xenopsylla cheopis* tends to verify the impression that conditions which result in *X. cheopis* infestation of rats predispose to typhus infection in rats in this area. (See table 9.)

TABLE 9.—*Comparison of the typhus serology of rats with their* Xenopsylla cheopis *infestation*

	Number with positive serology	Number with negative serology	Total	Percent positive
Rats infested with *X. cheopis*	126	102	228	55.3
Rats not infested with *X. cheopis*	66	137	203	32.5
Total	192	239	431	44.5
Percent of rats infested with *X. cheopis*	[1] 65.6	[1] 42.7	52.9	

[1] $x/\sigma=4.73$——[2] $P=0.0000$?
[2] The symbol P as used above expresses the probability of obtaining by chance, when the true difference is zero, a sample difference as great or greater than that obtained.

SUMMARY AND CONCLUSIONS

1. 500 typhus cases per 100,000 population can be considered the human morbidity rate of murine typhus fever for 1943 in Coffee County, Alabama.

2. Of 211 reputed typhus cases in 1943, serologic tests were done on 177, and of these 135 were positive for typhus. In addition, there were two deaths attributed to typhus (table 1).

3. A comparison of morbidity rates of the population under 30 years of age and the population 30 years and over shows a statistically significant difference probably attributable to conditions of greater exposure of those 30 years of age or older (table 2).

4. There is a significantly greater typhus morbidity rate among males than among females in Coffee County. This is consistent with the theory of greater exposure of the male population (table 2).

5. There were two deaths attributed to typhus fever out of 160 estimated cases—a case fatality rate of 1.25 percent.

6. When the 1943 cases are arranged by date of onset, there are two peaks of incidence, one in July and the other in October. When cases which were reported to the health department during the period 1942 through 1944 are arranged by date of reporting, there are similar summer and fall peaks which exhibit a lag of one month behind the curve based on date of onset (tables 3 and 4).

7. Of the 137 confirmed typhus cases, 115 (84 percent) were among rural residents, and 22 (16 percent) were among urban residents. The difference in rural and urban typhus rates in Coffee County is both practically and statistically insignificant. The probability of acquiring typhus fever in this county is about the same for rural and urban residents (table 5).

8. That there is widespread typhus infection among rats in the rural portion of the county is indicated by the fact that of blood specimens from 430 rats trapped on farms, 42 percent were positive for typhus complement-fixing antibodies (table 6).

9. Of 261 farms, 138 (53 percent) yielded one or more rats with positive serologic reactions for typhus. This percentage probably would have been much larger if three or more rats had been trapped on each farm (tables 7 and 8).

10. In this experience, infection of rats with typhus (as indicated by the complement-fixation test) is directly proportional to infestation with *Xenopsylla cheopis* (table 9).

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INCIDENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES

April 20–May 17, 1947

The accompanying table summarizes the incidence of nine important communicable diseases, based on weekly telegraphic reports from State health departments. The reports from each State for each week are published in PUBLIC HEALTH REPORTS under the section "Incidence of Disease." The table gives the number of cases of these diseases for the 4 weeks ended May 17, 1947, the number reported for the corresponding period in 1946, and the median number for the years 1942–46.

DISEASES ABOVE MEDIAN INCIDENCE

Diphtheria.—For the 4 weeks ended May 17 there were 785 cases of diphtheria reported. The number of cases was less than 80 percent of the incidence during the corresponding period in 1946, but it was slightly higher than the 1942–46 median. The greatest increases over the normal seasonal expectancy were reported from the New England and Middle Atlantic sections. In other sections the incidence either closely approximated the preceding 5-year median or fell below it.

Influenza.—The number of reported cases of influenza dropped from approximately 121,000 during the preceding 4 weeks to 15,461 during the 4 weeks ended May 17. The incidence was 4 times that recorded for the corresponding period in 1946 and 3 times the 1942–46 median. The recent influenza epidemic reached its peak about the middle of March, but the number of cases was still considerably above the normal seasonal expectancy in all sections except the Middle Atlantic and Pacific sections. Due, no doubt, to the rather late appearance of the rise in this disease the current incidence was the highest recorded for this period in the 19 years for which data are available in this form; the excesses ranged from 1.4 times the median in the East North Central section to almost 7 times the median in the New England section. For several weeks at the beginning of the recent epidemic the incidence was confined to a few States in the Southern and Western sections, but it eventually spread into all regions, reaching the North Atlantic sections last, and, while the numbers of cases were not large in those sections, they have represented considerable increases over the normal seasonal expectancy.

Poliomyelitis.—The number of cases (126) of poliomyelitis was only 60 percent of the cases reported during the corresponding period in 1946, but it was 10 percent above the 1942–46 median. The excess over the seasonal median was largely due to an increase in the number of cases in the Middle Atlantic, West North Central, and Pacific sections. New York reported 13 of the cases that occurred in the

Middle Atlantic section; in the West North Central section each State except South Dakota reported some cases, while in the Pacific section the cases (43) were all reported from California. In other sections the incidence was about the same as the median or fell below it.

Whooping cough.—For the 4 weeks ended May 17 there were 14,589 cases of whooping cough reported, as compared with 8,037 for the corresponding period in 1946, and a 5-year (1942–46) median of 10,548 cases. The New England section reported a decrease from the preceding 5-year median; in the Middle Atlantic and Pacific sections the incidence was about normal, but all other sections reported a relatively high incidence. The most significant increase was reported from the West South Central section where the number of cases (3,432) was 3 times the seasonal median.

DISEASES BELOW MEDIAN INCIDENCE

Measles.—The incidence of measles continued at a relatively low level. For the 4 weeks ended May 17 there were 34,109 cases reported, as compared with 147,499 for the corresponding period in 1946 and a 1942–46 median of 104,755 cases. Each section of the country has shared in the favorable situation of this disease that has existed since the latter part of 1946. With the exception of the year 1945, which was a very low measles year (19,000 cases for these 4 weeks), the current incidence was the lowest since 1940.

Meningococcus meningitis.—The number of cases (331) of meningococcus meningitis reported for the current 4 weeks was about 80 percent of the number reported for the corresponding period in 1946 and less than 50 percent of the 1942–46 median. The number of cases in each section was below the seasonal median and for the country as a whole the incidence was the lowest since 1941 when 181 cases were reported for the same 4-week period.

Scarlet fever.—This disease also continued at a relatively low level, the 7,989 cases reported for the current 4 weeks being less than 60 percent of the number reported for these same weeks in 1946 and about 50 percent of the 1942–46 median. The number of cases reported from each section was below the seasonal median expectancy. This disease has been on the decline since the latter part of 1945, each 4-week period being lower than its corresponding period in the preceding year.

Smallpox.—For the 4 weeks ended May 17 there were 39 cases of smallpox reported. In 1946 there were 41 cases reported during the corresponding 4 weeks and the 1942–46 median was 48 cases. Of the total cases, New Mexico reported 7, Indiana, Wisconsin, and Missouri, 5 each, Kentucky 3, and no more than 2 cases were reported from any other State. In New York City where an outbreak received

widespread attention the last 2 cases were reported during the week ended May 3, making a total of 14 cases around New York City and its environs. Cases of smallpox have occurred from time to time in practically all other sections of the country, but this is the first occurrence of smallpox in New York since 1939.

Typhoid and paratyphoid fever.—Although the number of cases (255) of these diseases was slightly above that reported for the corresponding weeks in 1946, the incidence was still at a relatively low level, being 10 percent below the 1942–46 median. With the exception of 1946 (249 cases) the current incidence was the lowest since 1943 when 244 cases were reported for the corresponding 4 weeks.

Number of reported cases of 9 communicable diseases in the United States during the 4-week period April 20–May 17, 1947, the number for the corresponding period in 1946, and the median number of cases reported for the corresponding period, 1942–46

Division	Current period	1946	5-year median	Current period	1946	5-year median	Current period	1946	5-year median
	Diphtheria			Influenza [1]			Measles [2]		
United States	735	1,068	780	15,461	3,873	5,210	34,109	147,499	104,755
New England	52	48	27	62	9	9	7,818	13,252	9,578
Middle Atlantic	177	173	112	33	44	41	5,454	49,905	14,927
East North Central	100	148	117	277	170	200	6,942	28,564	19,422
West North Central	74	137	73	857	23	93	3,967	5,337	7,512
South Atlantic	114	187	142	7,254	1,232	1,399	3,771	12,944	7,852
East South Central	51	52	57	1,371	117	374	1,552	2,796	2,269
West South Central	96	148	148	4,484	1,983	2,156	2,066	9,766	6,894
Mountain	57	68	58	893	212	461	1,457	8,030	5,039
Pacific	64	107	99	230	83	244	1,082	16,905	16,905
	Meningococcus meningitis			Poliomyelitis			Scarlet fever		
United States	331	428	712	128	210	118	7,989	13,617	15,612
New England	20	25	48	3	5	5	692	1,271	2,023
Middle Atlantic	53	104	156	14	18	9	2,490	4,577	4,577
East North Central	73	87	133	9	8	8	2,303	3,681	4,013
West North Central	34	34	49	17	13	6	681	914	1,153
South Atlantic	50	54	93	15	66	20	503	1,276	1,276
East South Central	28	35	71	5	5	12	237	263	372
West South Central	35	38	68	15	42	26	142	277	319
Mountain	3	4	15	5	24	3	319	470	765
Pacific	35	47	93	43	29	12	622	888	888
	Smallpox			Typhoid and paratyphoid fever			Whooping cough [2]		
United States	39	41	48	255	249	286	14,589	8,037	10,548
New England	0	0	0	23	7	14	842	965	1,110
Middle Atlantic	2	0	0	27	31	38	2,198	1,703	2,193
East North Central	11	16	16	58	26	39	2,588	1,683	1,683
West North Central	10	6	8	10	16	15	590	324	343
South Atlantic	2	2	3	31	48	51	2,066	1,143	1,596
East South Central	3	0	7	19	16	39	659	216	468
West South Central	2	3	5	49	64	68	3,432	911	1,172
Mountain	9	3	3	6	17	16	597	479	523
Pacific	0	11	3	32	24	19	1,617	613	1,633

[1] Mississippi, New York, and North Carolina excluded; New York City included.
[2] Mississippi excluded.

MORTALITY, ALL CAUSES

For the 4 weeks ended May 17 there were 36,937 deaths from all causes reported to the National Office of Vital Statistics by 93 large cities. The median number reported for the corresponding period in 1944–46 was 36,294. Each week of the period showed some increase over the preceding 3-year median, but the largest increase occurred during the last week when the number of deaths represented an increase of 4.8 percent over the median.

DEATHS DURING WEEK ENDED MAY 17, 1947

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended May 17, 1947	Corresponding week, 1946
Data for 93 large cities of the United States:		
Total deaths	9,331	8,901
Median for 3 prior years	8,906	
Total deaths, first 20 weeks of year	198,445	196,267
Deaths under 1 year of age	777	613
Median for 3 prior years	613	
Deaths under 1 year of age, first 20 weeks of year	15,841	12,218
Data from industrial insurance companies:		
Policies in force	67,292,728	67,171,251
Number of death claims	11,647	11,951
Death claims per 1,000 policies in force, annual rate	9.0	9.3
Death claims per 1,000 policies, first 20 weeks of year, annual rate	10.0	10.7

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED MAY 24, 1947

Summary

A total of 33 cases of poliomyelitis was reported for the week, as compared with 39 last week, 77 for the same week last year, and a 5-year (1942–46) median of 39. Of the current total, California reported 10 (last week 15), Texas 5, Florida 3, and 11 other States 1 or 2 cases each. Since the week ended March 15 (the approximate average date of seasonal low incidence), 300 cases have been reported (same period last year, 421), of which 220 occurred in the 10 States reporting 8 or more cases each for the period, as follows (last year's corresponding figures in parentheses): New York 30 (35), Illinois 12 (13), Michigan 9 (4), Missouri 8 (4), North Dakota 9 (1), Nebraska 9 (0), Florida 17 (89), Louisiana 10 (17), Texas 23 (68), California 93 (52).

Only 4 cases of smallpox were reported for the week—1 case each in Ohio, Georgia, Louisiana. and Texas. The total for the year to date is 131, as compared with 216 for the corresponding period last year, 241 for the 5-year median, and 211, the lowest number reported for a corresponding period in the past 5 years (in 1945).

A total of 555 cases of dysentery (amebic, bacillary, and undefined), was reported for the week, as compared with 666 for the corresponding week last year. The combined total to date is 11,323, as compared with 9,790 for the period last year, and 7,621 for the combined medians of the past 5 years.

Of 88 cases of typhoid and paratyphoid fever reported (last week 47, 5-year median 68), 14 occurred in Texas (last week 8), 12 in Illinois (last week 1), 8 in Ohio (last week 3), and 7 in Tennessee (last week 2). The cumulative total is 1,024, slightly below the 5-year median.

A total of 3,995 cases of whooping cough was reported for the week, as compared with 3,801 last week, 1,914 for the corresponding week last year, and a 5-year median of 2,540. The cumulative figure is 59,710, as compared with 38,940 for the period last year and a 5-year median of 52,392.

Deaths recorded during the week in 93 large cities of the United States totaled 8,923, as compared with 9,331 last week, 8,878 and 9,033, respectively, for the corresponding weeks of 1946 and 1945, and a 3-year (1944–46) median of 8,878. The cumulative total is 207,368, as compared with 205,145 for the corresponding period last year.

Telegraphic morbidity reports from State health officers for the week ended May 24, 1947, and comparison with corresponding week of 1946 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46
	May 24, 1947	May 25, 1946		May 24, 1947	May 25, 1946		May 24, 1947	May 25, 1946		May 24, 1947	May 25, 1946	
NEW ENGLAND												
Maine	1	3	0	------	------	------	104	354	81	0	0	1
New Hampshire	0	0	0	------	------	------	2	37	27	0	0	0
Vermont	0	0	0	------	------	------	114	62	62	0	0	0
Massachusetts	3	4	4	------	------	------	405	2,738	982	2	2	6
Rhode Island	2	0	0	------	------	------	123	106	60	0	0	0
Connecticut	1	1	0	1	------	2	952	593	437	0	2	4
MIDDLE ATLANTIC												
New York	16	23	13	[1] 14	[1] 2	[1] 3	616	3,323	770	7	12	26
New Jersey	7	6	2	------	5	5	447	3,455	925	3	6	11
Pennsylvania	13	16	11	([2])	[2] 2	[2] 1	323	3,184	1,143	6	9	9
EAST NORTH CENTRAL												
Ohio	9	12	7	6	3	9	825	745	412	3	8	8
Indiana	1	14	7	4	------	4	117	373	162	0	3	3
Illinois	3	4	13	71	1	4	331	625	419	5	9	16
Michigan [3]	5	5	4	1	1	1	173	926	886	5	4	4
Wisconsin	0	4	2	16	16	24	988	2,471	2,122	0	3	2
WEST NORTH CENTRAL												
Minnesota	3	8	3	------	------	------	839	71	476	3	3	3
Iowa	4	1	2	------	------	------	119	231	231	0	0	1
Missouri	4	3	2	1	5	1	43	113	159	2	3	12
North Dakota	1	1	0	------	5	5	125	13	13	1	0	0
South Dakota	1	1	1	1	------	------	136	44	44	0	1	0
Nebraska	1	1	1	------	------	1	6	489	63	0	0	0
Kansas	1	8	5	2	------	1	17	201	220	1	1	1
SOUTH ATLANTIC												
Delaware	0	1	0	------	------	------	1	24	20	0	0	0
Maryland [3]	5	18	8	2	3	3	65	819	290	3	3	5
District of Columbia	0	0	0	1	------	------	9	219	92	0	1	1
Virginia	3	5	4	324	133	75	262	687	186	2	4	9
West Virginia	0	5	3	18	------	4	63	83	51	0	0	0
North Carolina	3	6	3	------	------	2	157	293	310	0	2	4
South Carolina	2	9	8	243	138	155	107	456	141	0	0	2
Georgia	2	5	3	3	5	6	75	172	14[illegible]	0	0	1
Florida	5	6	1	7	3	1	35	202	168	0	2	3
EAST SOUTH CENTRAL												
Kentucky	8	6	2	------	------	1	22	111	74	2	6	3
Tennessee	5	1	2	79	5	8	44	148	69	7	3	3
Alabama	4	6	5	86	37	17	264	300	105	1	10	7
Mississippi [3]	6	7	5	24	------	------	19	------	------	3	1	3
WEST SOUTH CENTRAL												
Arkansas	4	3	3	24	8	10	52	175	75	0	6	3
Louisiana	9	0	1	2	1	2	19	64	64	1	0	1
Oklahoma	2	3	3	72	19	19	3	158	98	0	0	0
Texas	13	35	30	428	261	398	406	1,194	641	4	5	9
MOUNTAIN												
Montana	0	0	0	2	------	------	92	93	93	0	0	0
Idaho	0	0	0	27	11	------	9	70	50	0	0	0
Wyoming	1	0	0	11	------	------	4	56	56	0	0	0
Colorado	3	7	7	41	8	17	64	730	203	0	1	1
New Mexico	3	4	1	1	2	2	89	65	23	0	0	0
Arizona	1	15	4	46	24	33	69	161	67	0	0	0
Utah [3]	0	0	0	2	------	4	12	303	226	0	0	0
Nevada	0	0	0	------	------	------	------	1	5	0	0	0
PACIFIC												
Washington	4	3	4	16	------	------	23	278	285	0	2	2
Oregon	1	1	1	10	3	5	20	321	135	0	1	1
California	15	16	15	24	18	18	166	2,107	2,107	6	8	13
Total	175	[illegible]77	189	1,610	719	884	8,956	29,444	19,11[illegible]	67	[illegible]	182
21 weeks	5,392	7,[illegible]06	5,590	95,843	185,[illegible]4	75,305	154,454	510,099	[illegible]	1,8[illegible]7	3,500	4,704
Seasonal low week [4]	(27th) July 5–11			(30th) July 26–Aug 1			(35th) Aug. 30–Sept. 5			(37th) Sept. 13–19		
Total since low	12,978	18,850	14,369	328,818	547,47[illegible]	111,167	157,34[illegible]	542,22[illegible]	460,99[illegible]	2,799	5,004	7,156

[1] New York City only. [2] Philadelphia only. [3] Period ended earlier than Saturday.
[4] Dates between which the approximate low week ends. The specific date will vary from year to year.

Telegraphic morbidity reports from State health officers for the week ended May 24, 1947, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Poliomyelitis: Week ended— May 24, 1947	Poliomyelitis: Week ended— May 25, 1946	Poliomyelitis: Median 1942–46	Scarlet fever: Week ended— May 24, 1947	Scarlet fever: Week ended— May 25, 1946	Scarlet fever: Median 1942–46	Smallpox: Week ended— May 24, 1947	Smallpox: Week ended— May 25, 1946	Smallpox: Median 1942–46	Typhoid and paratyphoid fever: Week ended— May 24, 1947 [5]	Typhoid and paratyphoid fever: Week ended— May 25, 1946	Typhoid and paratyphoid fever: Median 1942–46
NEW ENGLAND												
Maine	0	0	0	8	23	23	0	0	0	0	1	0
New Hampshire	0	0	0	4	24	11	0	0	0	0	0	0
Vermont	0	0	0	12	7	7	0	0	0	0	0	0
Massachusetts	0	0	0	98	174	286	0	0	0	1	2	2
Rhode Island	0	0	0	7	12	12	0	0	0	0	0	0
Connecticut	0	0	0	34	37	57	0	0	0	0	2	1
MIDDLE ATLANTIC												
New York	1	0	3	289	494	448	0	0	0	4	2	2
New Jersey	1	1	0	132	142	116	0	0	0	1	0	1
Pennsylvania	0	1	1	223	395	395	0	0	0	2	2	8
EAST NORTH CENTRAL												
Ohio	1	1	1	192	301	301	1	6	0	8	1	1
Indiana	0	0	0	39	52	39	0	5	2	1	1	2
Illinois	0	2	0	72	179	194	0	0	0	12	1	2
Michigan [3]	0	0	0	135	135	192	0	0	0	1	0	0
Wisconsin	0	0	0	56	98	244	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	0	2	0	39	56	56	0	1	0	0	0	0
Iowa	0	1	0	18	63	42	0	0	0	0	2	1
Missouri	0	0	0	27	23	49	0	0	0	0	8	3
North Dakota	1	0	0	2	3	5	0	0	0	0	0	0
South Dakota	0	0	0	4	9	9	0	0	0	0	0	0
Nebraska	0	0	0	11	24	13	0	0	0	2	0	0
Kansas	0	1	1	20	45	51	0	1	0	0	1	1
SOUTH ATLANTIC												
Delaware	0	0	0	8	2	4	0	0	0	0	0	0
Maryland [3]	2	0	0	37	98	98	0	0	0	3	0	2
District of Columbia	0	0	0	7	12	12	0	0	0	0	0	0
Virginia	0	0	1	25	37	37	0	0	0	3	1	1
West Virginia	0	0	0	10	17	24	0	0	0	1	0	1
North Carolina	1	1	0	20	28	20	0	0	0	1	0	1
South Carolina	0	1	1	4	9	5	0	0	0	1	2	2
Georgia	0	1	1	1	1	8	1	0	0	4	4	5
Florida	3	22	1	2	1	3	0	0	0	0	2	3
EAST SOUTH CENTRAL												
Kentucky	0	0		10	33	36	0	0	0	5	0	1
Tennessee	0	0	0	14	25	25	0	0	0	7	3	3
Alabama	1	0	1	5	7	8	0	0	0	2	6	3
Mississippi [3]	2	0	0	0	9	4	0	0	1	1	3	2
WEST SOUTH CENTRAL												
Arkansas	0	1	1	5	1	4	0	0	0	2	3	3
Louisiana	0	5	1	4	0	1	1	0	0	2	3	3
Oklahoma	0	1	0	3	1	12	0	0	0	3	0	1
Texas	5	23	6	23	33	43	1	0	0	14	7	7
MOUNTAIN												
Montana	0	0	0	4	3	14	0	0	0	1	0	0
Idaho	0	0	0	5	7	18	0	0	0	0	1	1
Wyoming	0	0	0	7	2	6	0	0	0	0	0	0
Colorado	0	2	0	28	34	34	0	3	0	0	0	0
New Mexico	0	0	0	3	7	7	0	0	0	1	2	0
Arizona	2	0	0	4	8	15	0	0	0	1	1	0
Utah [3]	0	0	0	7	19	20	0	0	0	0	0	0
Nevada	0	0	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	2	2	1	24	18	43	0	0	0	0	1	0
Oregon	1	0	0	16	39	26	0	0	0	0	3	1
California	10	9	4	113	145	145	0	0	0	4	5	5
Total	33	77	39	1,811	2,892	3,088	4	10	10	88	65	68
21 weeks	927	889	547	52,672	72,816	82,498	131	216	241	1,024	1,094	1,242
Seasonal low week [4]	(11th) Mar. 15–21			(32nd) Aug. 9–15			(35th) Aug. 30–Sept. 5			(11th) Mar. 15–21		
Total since low	300	421	245	79,358	111,387	120,819	185	292	358	539	619	651

[3] Period ended earlier than Saturday.
[4] Dates between which the approximate low week ends. The specific date will vary from year to year.
[5] Including paratyphoid fever reported separately, as follows: Massachusetts 1 (salmonella infection); Ohio 1; Indiana 1; Illinois 1; Virginia 1; Georgia 1; Texas 1; California 2.

Telegraphic morbidity reports from State health officers for the week ended May 24, 1947, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Whooping cough: Week ended— May 24, 1947	Whooping cough: Week ended— May 25, 1946	Whooping cough: Median 1942–46	Week ended May 24, 1947: Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis, infectious	Rocky Mt. spotted fever	Tularemia	Typhus fever, endemic	Undulant fever
NEW ENGLAND											
Maine	6	3	24								
New Hampshire		3	3								
Vermont	9	14	14								2
Massachusetts	127	108	118								3
Rhode Island	21	25	20								
Connecticut	53	53	53								9
MIDDLE ATLANTIC											
New York	199	172	210	7	28						2
New Jersey	235	112	117	2		1					1
Pennsylvania	159	100	184				1	1			1
EAST NORTH CENTRAL											
Ohio	174	57	94	1							
Indiana	62	15	30		1			1			
Illinois	85	94	94	5	2			2			12
Michigan [3]	274	108	108		1						6
Wisconsin	136	98	98								15
WEST NORTH CENTRAL											
Minnesota	50	5	20	3							4
Iowa	11	27	18	1							
Missouri	35	18	16						1		
North Dakota	4	2	2								
South Dakota	2					2					
Nebraska	11	5	4	1							3
Kansas	37	15	34								2
SOUTH ATLANTIC											
Delaware	2		1								
Maryland [3]	88	17	54					1			2
District of Columbia	1	8	14					1			
Virginia	61	80	89	1		75		1			4
West Virginia	38	18	18				1				
North Carolina	94	72	165	1	1				1		
South Carolina	142	64	74	4	19					2	1
Georgia	82	13	13	1	2				4	4	
Florida	47	21	22	2						2	
EAST SOUTH CENTRAL											
Kentucky	50	24	58								
Tennessee	58	61	61	2		5	1	1	5		2
Alabama	37	12	35							7	1
Mississippi [3]	25			6	2				3		6
WEST SOUTH CENTRAL											
Arkansas	26	18	18	3		1			4	1	
Louisiana	21	9	7	9					1		2
Oklahoma	15	24	13					2	3		2
Texas	983	170	250	11	200	34		2		9	7
MOUNTAIN											
Montana	10	6	6								1
Idaho	31	21	3								
Wyoming	3		1					3			
Colorado	33	23	21					1			1
New Mexico	15	18	10								
Arizona	51	41	18			22					1
Utah [3]	7	8	43						1		1
Nevada											
PACIFIC											
Washington	22	35	35		4						2
Oregon	16	46	27	1			1	1			
California	847	71	333	3	1		1				8
Total	3,995	1,914	2,540	64	351	140	5	17	28	25	101
Same week, 1946	1,914			58	460	148	11	9	20	54	85
Median, 1942–46	2,540			29	375	117	11	9	14	54	[6] 96
21 weeks: 1947	59,710			1,016	6,212	4,095	140	63	644	774	2,203
1946	38,940			821	6,714	2,255	177	65	376	963	1,769
Median, 1942–46	52,392			626	5,446	1,549	177	65	364	963	[6] 1,818

[3] Period ended earlier than Saturday.
[6] 2-year average, 1945–46.

Anthrax: New York 2 cases
Leprosy: Texas 1 case.

NOTIFIABLE DISEASES, FIRST QUARTER, 1947

The figures in the following table are the totals of the monthly morbidity reports received from the State health authorities for January, February, and March 1947. These reports are preliminary and the figures are therefore more or less incomplete and subject to correction by final reports. In most instances they include cases reported in both civilian and military populations. The comparisons made are with similar preliminary reports; but, owing to population shifts in many States since the 1940 census, the figures for some States may not be comparable with those for prior years, especially for certain diseases. Each State health officer has been requested to include in the monthly report for his State all diseases that are required by law or regulation to be reported in the State, although some do not do so. The lists of diseases required to be reported are not the same for each State. Only 11 of the common communicable diseases are notifiable in all the States. In some instances cases are reported, in some States, of diseases that are not required by law or regulation to be reported and the figures are included although manifestly incomplete. There are also variations among the States in the degree of, and checks on, the completeness of reporting of cases of the notifiable diseases; therefore, comparisons as between States may not be justified for certain diseases. As compared with the deaths, incomplete case reports are obvious for such diseases as malaria, pellagra, pneumonia, and tuberculosis, while in many States other diseases, such as puerperal septicemia, rheumatic fever, and Vincent's infection, are not reportable.

In spite of these known deficiencies, however, these monthly reports, which are published quarterly and annually in consolidated form, have proved of value in presenting early information regarding the reported incidence of a large group of diseases and in indicating trends by providing a comparison with similar preliminary figures for prior years. The table gives a general picture of the geographic prevalence of certain diseases, as the States are arranged by geographic areas.

Leaders are used in the table to indicate that no case of the disease was reported.

Consolidated monthly State morbidity reports for January, February, and March 1947

Division and State	Anthrax	Chickenpox	Conjunctivitis [1]	Diphtheria*	Dysentery, amebic	Dysentery, bacillary	Dysentery, undefined	Encephalitis, infectious	German measles	Hookworm disease	Influenza	Malaria [2]	Measles*	Meningitis, meningococcus*	Mumps	Ophthalmia	Pellagra	Pneumonia, all *forms*
NEW ENGLAND																		
Maine	1	951	--------	35	1	--------	--------	1	57	--------	21	6	3,053	7	1,082	--------	--------	235
New Hampshire	--------	349	--------	1	1	--------	--------	1	29	--------	24	--------	271	7	51	--------	--------	59
Vermont	--------	753	--------	3	--------	--------	--------	--------	60	--------	251	--------	2,592	2	199	--------	--------	47
Massachusetts	1	8,000	85	207	5	32	--------	3	320	--------	--------	40	5,697	20	2,511	[3] 48	--------	[4] 442
Rhode Island	--------	388	--------	11	--------	--------	--------	1	19	--------	10	12	2,189	1	120	--------	--------	100
Connecticut	--------	3,758	21	4	2	--------	--------	2	133	--------	16	30	5,284	11	1,864	--------	--------	576
MIDDLE ATLANTIC																		
New York	3	10,588	2	227	78	35	--------	12	[5] 229	[5] 32	[5] 114	154	3,122	96	[5] 1,538	[3] 18	--------	4,267
New Jersey	3	15,103	--------	72	15	--------	1	2	458	--------	116	49	2,968	35	3,719	[3] 1	--------	1,307
Pennsylvania	8	15,503	--------	175	6	--------	--------	2	--------	--------	46	--------	7,535	82	7,888	[3] 6	4	1,674
EAST NORTH CENTRAL																		
Ohio	--------	7,365	6	159	3	1	--------	--------	115	--------	371	7	6,932	35	3,985	[3] 144	--------	998
Indiana	--------	1,578	6	160	--------	1	1	21	9	--------	1,481	20	487	11	504	--------	--------	204
Illinois	--------	6,501	82	55	45	4	--------	10	123	1	789	[6] 74	587	56	1,526	--------	--------	1,578
Michigan	--------	7,108	45	85	9	11	--------	--------	202	--------	139	59	960	33	2,481	[3] 5	--------	864
Wisconsin	--------	9,517	--------	23	4	--------	--------	3	65	--------	2,815	--------	2,311	18	3,263	--------	--------	[4] 234

WEST NORTH CENTRAL																		
Minnesota		2,355		156	[7] 20	3	2			1	33	138	625	29				38
Iowa		1,255		23	15			2	15		16,865	11	443	27	388			86
Missouri		1,058		61			3		3		1,186	43	90	40	176			526
North Dakota		111	4	15							501		74	4				199
South Dakota		236		19			17				35	1	132	5	61			82
Nebraska		780		19	5		2				465	7	105	5	119			109
Kansas		1,735	46	68				1	29		15,513	3	98	12	583			430
SOUTH ATLANTIC																		
Delaware		165		3									20	2	17			11
Maryland		1,435	1	90	2		4		32		127	1	353	26	363	[3] 5		523
District of Columbia		649		3							22		247	4	247		1	330
Virginia		1,988		89	7		1,013				11,600	29	3,371	33	1,018		7	1,090
West Virginia		513		46	1			1			8,036	1	1,023	14	268			226
North Carolina				108		1						25	3,177	18				
South Carolina		1,445		53	22	104		8	76	228	11,333	467	867	15	205	[3] 7	133	1,327
Georgia		881	11	58	7	24	2			1,326	3,714	58	2,055	14	81		4	339
Florida		1,065	12	78	13	1	4	1	30	1,138	418	35	134	24	321	[3] 4	5	253
EAST SOUTH CENTRAL																		H
Kentucky		754		127				3			[8] 87,520	55	339	33	797			310
Tennessee		1,010	4	104	11	1	1	4	34	2	2,365	24	869	28	512	[3] 1	9	933
Alabama		825		102	8				30		4,357	69	675	34	289		4	841
Mississippi		360		72	44	59				744	1,897	152	203	15	140	[3] 11	8	553
WEST SOUTH CENTRAL																		
Arkansas		513		63	7	11	61		26	1	18,825	70	1,402	19	330		5	1,011
Louisiana		352		83	112	7		1	6	90	662	35	390	29	570	[3] 2	1	502
Oklahoma		504		57	10	2	1	1	29	21	16,795	125	58	16	305	[3] 2	6	649
Texas		9,114		334	159	3,992	1,370				81,860	856	2,060	81	8,116	[3] 25	168	4,868
MOUNTAIN																		
Montana		413		9	1				20		1,975		2,486	4	366			140
Idaho		447	35	7			2	1	35		816	8	80	3	531			207
Wyoming		344	11	10					60		221	9	126	4	98			48
Colorado		1,459		79	1	1			180		7,430		510	9	923			655
New Mexico		478	8	25	3	7	2	2	10		63	12	578		319		3	458
Arizona		1,107		47	2		315	1	50		2,068	13	663	4	426	[3] 3	1	696
Utah		1,697		2	1				65	1	630	17	109	2	1,338			160
Nevada		298	9					2			9	2	17	3	344			76
PACIFIC																		
Washington		3,465	178	78	21	4	16	6	301		1,062	5	453	18	1,358			208
Oregon		1,029	8	38	9		1	2			707	10	387	9	736			337
California		15,748	4	313	31	35		12	708		410	45	2,499	94	5,415			[4] 537
Total	16	143,050	578	3,656	681	4,336	2,818	106	3,558	3,585	[8] 305,716	[6] 2,777	70,706	1,091	57,491	[3] 282	359	31,433
First quarter 1946	10	74,308	388	4,995	887	5,418	1,271	113	19,675	3,327	213,750	10,930	229,417	2,512	56,852	330	955	44,995
Median 1942–46	14	128,054		3,981	630	3,946	1,100	113	19,675	4,142	86,624	6,378	222,463	3,231	76,829	387	907	52,346
Alaska		93		1	1		4		7		192		4		3			3
Hawaii Territory		890	5	1	12	26			47	3	5	[9] 11	17	7	135			[4] 25
Panama Canal Zone [10]		91		224	6	16		1				133	49	5	9			[11] 48

See footnotes on page 894.

Consolidated monthly State morbidity reports for January, February, and March 1947—Continued

Division and State	Polio-myelitis*	Rabies in man	Rheumatic fever	Rocky Mountain spotted fever	Scarlet fever*	Septic sore throat	Small-pox*	Tetanus	Trachoma	Trichinosis	Tuberculosis, all forms*	Tuberculosis, respiratory	Tularemia	Typhoid fever*	Paratyphoid fever	Typhus fever, endemic	Undulant fever*	Vincent's infection	Whooping cough*
NEW ENGLAND																			
Maine	3				365	11					143	136		3	1		8	5	219
New Hampshire	3				184	32					34	11		1			16	20	101
Vermont	8				87						51	51		1	1		30		202
Massachusetts	7				1,849	49		2	4	16	682	640	1	4	33		14		2,160
Rhode Island	1		10		213	6					137	134			1		6	1	248
Connecticut	3				560	57		2		2	341	324		2		1	34		616
MIDDLE ATLANTIC																			
New York	31				[12] 4,509	([13])	7	10		35	3,237	3,079	2	20	8	1	66		2,391
New Jersey	5			1	1,707	70				11	828			8	3		11		1,712
Pennsylvania	16		393		2,701			2		5	1,018		4	37	[14] 6		30		2,592
EAST NORTH CENTRAL																			
Ohio	9		18		4,896	30	6	1	3	6	1,579		3	8	1	1	31	8	1,654
Indiana	17			1	1,496	73	15	1		2	620	588	33	26	[14] 1		43		440
Illinois	24		46		1,868	57	2	1	5	3	1,532	1,424	63	21		1	118	51	1,134
Michigan	27		72		1,959	114				2	1,494		4	8	[14] 20		44		2,805
Wisconsin	11				1,019	72					508		3	7			71		1,823
WEST NORTH CENTRAL																			
Minnesota	15		37		701	82				36	[7] 329		1	4	[14] 2		81	26	125
Iowa	8		1		566	26	1				168			4			234		213
Missouri	11		37		503	19	2				637		25	11			37	4	295
North Dakota	9		1		132	3			19		59	59		4				14	5
South Dakota	2				134	6	1		2		73			1	2		9	1	24
Nebraska	12				487		4				119			3			2		192
Kansas	9		4		687	4	5		4		170	163	6	2			38	73	177
SOUTH ATLANTIC																			
Delaware					170	1			1		49	49		1			2		88
Maryland	5		41		416	45		2		2	638	623	2		1	5	10		866
District of Columbia	2				150						447	435	4	2					63
Virginia	12			1	538	480		1			942		26	16	1	3	3		1,031
West Virginia	4				279	4					710		2	11			2		259
North Carolina	12			1	430	6					1,072	1,038	32	8		20			593
South Carolina	1		107		143	1,213		14		1	85		18	11		17	4		485
Georgia	6		10		232	63	2	3			475	473	52	5	8	132	21	24	192
Florida	23				157	42		7			1,025	1,025	3	16	[14] 3	63	10	51	420

EAST SOUTH CENTRAL																			
Kentucky	1				614	25	1		6		500	496	12	15	3	4	3		455
Tennessee	10		20		559	59	5	8	2	1	1,278		45	15		17	14	68	358
Alabama	15	1			224		1	9			713		9	8		56	32		531
Mississippi	15				128		2				455	437	24	7		19	22		182
WEST SOUTH CENTRAL																			
Arkansas	11				59	178	3	3	87	1	426	416	31	7	2	10	4		221
Louisiana	17		13		77	46	1	5			515	492	13	29	7	46	9		94
Oklahoma	10			6	117	54			39		363		27	11		1	12	4	140
Texas	28				573	[11] 405	10		11		1,567		7	33	5	142	142		4,906
MOUNTAIN																			
Montana	1		5		85	17			10		135	83	2	3			3		76
Idaho	10		9	1	140	101			1	2	43			2	3		6	8	45
Wyoming	3				107	23					11		1		[14] 2			5	26
Colorado	4		100		699	316	1				451			5	2		20	3	167
New Mexico	3		5		112	6	2	1	34		351	333					1		172
Arizona	3				98				40		507			15	1		2		263
Utah	5		13		243	19					24	22	2				15		64
Nevada					56	27			4	3	58			1				15	8
PACIFIC																			
Washington	9		96		566	78		1			593			7	[14] 6		25	224	434
Oregon	5		12		352	17				1	225	220		9	2		7		146
California	177	1	238		1,905	185	2	16	4	3	2,309	2,163	1	18	26	10	56		1,755
Total	623	2	1,288	11	35,802	4,121	73	89	276	132	29,726	14,014	458	430	[14] 151	549	1,348	605	33,168
First quarter 1946	491	2	1,243	6	44,899	2,152	130	66	526	49	27,536	14,524	250	466	[14] 110	600	1,000	508	25,146
Median 1942-46	338	4		5	51,491	2,152	159	62	611	101	27,536	15,065	237	723		600	684	508	34,023
Alaska					4	39					187						1		
Hawaii Territory	9				2	18		3			348	342				8			69
Panama Canal Zone [16]	1										[11] 6			2	1	2			[11] 5

See footnotes on p. 894.

FOOTNOTES FOR TABLE ON PAGES 890 TO 893

*Diseases marked with an asterisk (*) are reportable by law or regulation in all the States, including the District of Columbia. Typhoid fever is reportable in all the States; paratyphoid fever in all except 6 States. Syphilis is reportable in all the States and the District of Columbia but is not included in the table. Some States have increased and some have reduced the list of reportable diseases since the latest published compilation of reportable diseases (Pub. Health Rep., 59:317-340 (Mar. 10, 1944). Reprint No. 2544).

1 Includes cases of kerato- and suppurative conjunctivitis and of pink eye.
2 In a few States practically all cases contracted outside continental United States.
3 Ophthalmia neonatorum.
4 Lobar pneumonia only.
5 New York city only.
6 Exclusive of 40 cases of artificially induced malaria.
7 Includes nonresidents.
8 Includes estimated number of cases.
9 Off-shipping.
10 Includes the cities of Colon and Panama.
11 In the Canal Zone only.
12 Includes septic sore throat.
13 Included in scarlet fever.
14 Includes cases reported as "salmonella infection."
15 The number of cases of septic sore throat reported in Texas for the 4th quarter of 1946 should be 376 and for the United States should be 3,631 instead of the figures as published on p. 363 of the PUBLIC HEALTH REPORTS for Mar. 7, 1947; for the year 1946, the total number of reported cases of septic sore throat in Texas should be 865 and for the United States should be 9,525 instead of the figures as published on p. 407 of the PUBLIC HEALTH REPORTS for Mar. 14, 1947.

The following list includes certain rare conditions, diseases of restricted geographical distribution, and those reportable in or reported by only a few States; last year's figures in parentheses (where no figures are given, no cases were reported last year):

Actinomycosis: Minnesota 3(4).
Botulism: Connecticut 2, New York 1, New Jersey 1, Maryland 4, New Mexico 4, Washington 5.
Coccidioidomycosis: California 10(14).
Dengue: South Carolina 2 (2), Mississippi 1, Texas 3(3).
Dermatitis: New Hampshire 5, Missouri 53.
Diarrhea: New York 80, New Jersey 11, Pennsylvania 17(3), Ohio 68 (63) includes enteritis, Illinois 9(3), North Dakota 2, Maryland 41(26), South Carolina 3,477(2,300), Florida 8(6), Colorado 2(3) includes enteritis, Washington 76 (56), Oregon 29, California 77(18).
Dog bite: New Hampshire 2, Illinois 1,840 (2140) all animal bites, Michigan 999 (1,232), Arkansas 128 (206) all animal bites.
Food poisoning: New Jersey 4, Ohio 2, Indiana 1(6), Illinois 17(3), Louisiana 4(1), Idaho 1 (1), Colorado 1, Oregon 1, California 116 (104).
Granuloma inguinale: Florida 81 (43), Tennessee 24 (17), Mississippi 145 (204), Louisiana 38 (93), Arizona 1 (1), Washington 378, California 4.
Impetigo contagiosa: New York 41, Ohio 4 (5), Indiana 7 (26), Illinois 5 (10), Michigan 350 (23), Missouri 3 (3), North Dakota 1 (8), Kansas 12 (4), Montana 15 (2), Idaho 13 (16), Wyoming 12 (3), Colorado 2 (24), Nevada 48 (44), Washington 334 (258), Alaska 2, Hawaii Territory 7 (5).
Jaundice (including hepatitis and Weil's disease): Maine 14, New Hampshire 4, New York 236, Ohio 4 (4), Indiana 6 (33), Illinois 9 (19), Michigan 5 (15), Minnesota 8 (9), North Dakota 12 (2), Maryland 4 (5), Florida 13 (4), Tennessee 3 (2), Idaho 1 (1), Wyoming 5, Washington 4 (29), Oregon 20 (18), California 41 (101), Hawaii Territory 4 (5).
Leprosy: Louisiana 2, Texas 3, California 7 (2), Panama Canal Zone 1, Hawaii Territory 4 (8).
Lymphocytic choriomeningitis: Massachusetts 3, Minnesota 2, Tennessee 6 (4).
Lymphogranuloma venereum: Missouri 12 (12), Florida 108 (24), Tennessee 28 (41), Louisiana 26 (42).
Psittacosis: New York 1, Ohio 1, Michigan 5, California 2.
Puerperal septicemia: Florida 1, Mississippi 7 (70), Louisiana 8, New Mexico 1.
Rabies in animals: New York 147 (224), Ohio 190 (228), Illinois 88 (101), Michigan 70 (2), Kansas 11 (14), Maryland 7 (8), South Carolina 54 (44), Florida 64 (4), Alabama 155 (233), Arkansas 26 (42), Louisiana 4 (20) Texas 323 (218), Colorado 8, New Mexico 2 (7), Utah 6 (1), California 78 (102), Alaska 2.
Rat bite fever: Louisiana 1.
Relapsing fever: Texas 10 (10), Nevada 1.
Ringworm disease: Pennsylvania 273 (147), Ohio 22 (20), Illinois 1,366 (1,025), Michigan 492 (228), Minnesota 9 (87), Iowa 363 (10), Kansas 8 (3), Maryland 1, Montana 1 (4), Idaho 13 (14), Wyoming 1 (1), Utah 75, Washington 253 (232).
Scabies: Rhode Island 8, Pennsylvania 186 (84), Ohio 25, Michigan 382 (408), Missouri 39 (6), North Dakota 2 (10), Kansas 49 (52), Montana 70 (22), Idaho 78 (64), Wyoming 5 (1), Nevada 21 (24), Alaska 2.
Silicosis: New Hampshire 1 (1), Kansas 2, New Mexico 4 (3), Idaho 1, Washington 2.

WEEKLY REPORTS FROM CITIES [1]

City reports for week ended May 17, 1947

This table lists the reports from 90 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0	------	0	60	0	3	0	0	0	0	6
New Hampshire:												
Concord	0	0	------	0	------	0	1	0	0	0	0	------
Vermont:												
Barre	0	0	------	0	1	0	0	0	0	0	0	1
Massachusetts:												
Boston	3	0	------	0	107	1	14	0	13	0	0	32
Fall River	0	0	------	0	30	0	0	0	3	0	0	9
Springfield	0	0	------	0	30	0	0	0	3	0	0	4
Worcester	0	0	------	0	10	0	3	0	0	0	1	13
Rhode Island:												
Providence	0	0	------	0	199	0	1	0	0	0	0	44
Connecticut:												
Bridgeport	0	0	------	0	24	0	1	0	3	0	0	1
Hartford	0	0	------	0	106	0	0	1	2	0	0	------
New Haven	0	0	------	0	104	1	0	0	6	0	2	15
MIDDLE ATLANTIC												
New York:												
Buffalo	1	0	------	0	1	1	4	0	6	0	0	3
New York	12	0	2	0	434	6	50	2	104	0	3	71
Rochester	0	0	------	0	2	0	3	1	13	0	1	12
Syracuse	0	0	------	0	------	1	2	0	12	0	0	12
New Jersey:												
Camden	1	0	------	0	1	0	1	0	4	0	0	3
Newark	0	0	------	0	16	0	1	0	10	0	0	42
Trenton	1	0	------	0	5	0	0	0	3	0	0	1
Pennsylvania:												
Philadelphia	3	0	1	0	15	1	27	0	55	0	1	57
Pittsburgh	1	0	1	1	15	0	9	0	23	0	0	16
Reading	0	0	------	0	2	0	0	0	4	0	0	1
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	0	0	------	0	------	0	2	0	7	0	0	13
Cleveland	3	0	1	0	165	1	8	0	40	0	0	49
Columbus	0	0	1	1	180	0	2	0	5	0	0	26
Indiana:												
Fort Wayne	0	0	------	0	13	0	1	0	1	0	0	3
Indianapolis	1	0	------	0	4	2	1	0	16	0	0	24
South Bend	0	0	------	0	34	0	0	0	0	0	0	2
Terre Haute	0	0	------	0	------	0	2	0	0	0	0	2
Illinois:												
Chicago	1	0	------	0	26	2	35	0	31	0	0	29
Springfield	------	------	------	------	------	------	------	------	------	------	------	------
Michigan:												
Detroit	5	0	------	0	2	1	13	0	50	0	0	90
Flint	1	0	------	0	1	0	0	0	0	0	0	1
Grand Rapids	0	0	------	0	7	0	1	0	7	0	0	8
Wisconsin:												
Kenosha	0	0	------	0	1	0	0	0	1	0	0	3
Milwaukee	0	0	2	2	49	0	2	0	18	0	0	15
Racine	0	0	------	0	------	0	0	0	14	0	0	8
Superior	0	0	------	0	------	0	0	0	0	0	0	------
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0	------	0	------	0	1	0	4	0	0	8
Minneapolis	2	0	------	0	21	0	3	0	36	0	0	6
St. Paul	4	0	------	0	573	0	3	0	5	0	0	20
Missouri:												
Kansas City	0	0	------	0	------	0	5	0	14	0	0	3
St. Joseph	0	0	------	0	1	0	0	0	1	0	0	------
St. Louis	3	0	------	0	25	2	10	0	16	0	0	19

[1] In some instances the figures include nonresident cases.

City reports for week ended May 17, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
North Dakota:												
Fargo	0	0	------	0	17	0	0	0	1	0	0	------
Nebraska:												
Omaha	0	0	------	0	5	0	2	2	0	0	0	------
Kansas:												
Topeka	0	0	------	0	1	0	2	0	8	0	0	1
Wichita	0	0	------	0	------	0	1	0	1	0	0	7
SOUTH ATLANTIC												
Delaware:												
Wilmington	1	0	------	0	------	0	0	0	2	0	0	1
Maryland:												
Baltimore	3	0	1	0	15	0	7	0	10	0	0	84
Cumberland	0	0	------	0	------	0	0	0	0	0	0	------
Frederick	0	0	------	0	------	0	0	0	0	0	0	------
District of Columbia:												
Washington	0	0	------	0	11	1	4	0	6	0	0	5
Virginia:												
Lynchburg	1	0	------	0	1	0	0	0	0	0	0	------
Richmond	0	0	------	0	52	0	1	0	3	0	0	7
Roanoke	0	0	------	0	16	0	0	0	1	0	0	------
West Virginia:												
Charleston	0	0	------	0	------	0	0	0	1	0	0	------
Wheeling	0	0	------	0	------	0	1	0	0	0	0	------
North Carolina:												
Raleigh	0	0	------	0	9	0	0	0	0	0	0	12
Wilmington	0	0	------	0	5	0	0	0	0	0	0	------
Winston Salem	0	0	------	0	23	0	1	0	0	0	0	2
South Carolina:												
Charleston	0	0	7	0	21	0	1	0	1	0	0	14
Georgia:												
Atlanta	0	0	1	1	11	0	1	0	0	0	0	------
Brunswick	0	0	------	0	1	0	0	0	0	0	0	------
Savannah	0	0	1	1	1	0	0	0	0	0	0	------
Florida:												
Tampa	0	0	------	0	4	0	3	1	1	0	0	2
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	0	0	1	0	1	0	5	0	2	0	0	18
Nashville	0	0	------	0	------	0	1	0	3	0	0	6
Alabama:												
Birmingham	0	0	5	0	29	0	0	0	0	0	0	2
Mobile	0	0	1	0	5	0	0	0	0	0	0	------
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	------	2	------	0	1	0	0	0	0	------
Louisiana:												
New Orleans	2	0	5	0	30	5	9	0	2	0	2	9
Shreveport	0	0	------	0	------	0	4	0	0	0	0	------
Oklahoma:												
Oklahoma City	0	0	2	1	1	0	4	0	0	0	0	------
Texas:												
Dallas	0	0	1	1	220	0	3	0	4	0	0	18
Galveston	0	0	------	0	------	0	1	0	0	0	0	------
Houston	1	0	------	0	3	0	3	0	2	0	0	7
San Antonio	0	0	------	1	------	0	2	1	0	0	0	1
MOUNTAIN												
Montana:												
Billings	0	0	------	0	2	0	0	0	1	0	0	------
Great Falls	0	0	------	0	7	0	0	0	2	0	0	------
Helena	0	0	------	0	------	0	0	0	0	0	0	------
Missoula	0	0	------	0	5	0	0	0	0	0	0	------
Idaho:												
Boise	0	0	------	0	------	0	3	0	3	0	0	2
Colorado:												
Denver	4	0	1	0	35	0	9	0	17	0	0	9
Pueblo	0	0	------	0	1	0	0	0	5	0	0	------
Utah:												
Salt Lake City	0	0	------	0	3	0	0	0	3	0	0	1

City reports for week ended May 17, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle	0	0		0	4	1	0	0	3	0	0	9
Spokane	0	0		0		0	1	0	1	0	0	3
Tacoma	0	0		0	1	0	0	0	1	0	0	1
California:												
Los Angeles	7	0	10	1	14	1	4	0	34	0	1	57
Sacramento	2	0		0		0	1	0	1	0	0	3
San Francisco	0	0		0	6	1	2	0	7	0	1	5
Total	63	0	44	12	2,824	28	286	8	656	0	12	958
Corresponding week, 1946*	71		35	9	8.150		271		1,113	1	16	538
Average 1942-46*	62		45	[2] 13	[3] 5,594		[2] 305		1,331	1	15	770

[2] 3-year average, 1944-46.
[3] 5-year median, 1942-46.
*Exclusive of Oklahoma City.

Dysentery, amebic.—Cases: New Haven 1; New York 3; St. Louis 1; Memphis 1; New Orleans 8; Los Angeles 4.
Dysentery, bacillary.—Cases: Worcester 2; Chicago 1; Los Angeles 2.
Dysentery, unspecified.—Cases: Cincinnati 7; Baltimore 1; San Antonio 2.
Leprosy —Cases: Philadelphia 1.
Rocky Mt spotted fever.—Cases: Lynchburg 1.
Tularemia.—Cases: St. Louis 1; New Orleans 1.
Typhus fever, endemic.—Cases: New York 1; San Antonio 1.

Rates (annual basis) per 100,000 population, by geographic groups, for the 90 cities in the preceding table (latest available estimated population, 34,558,600)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England	7.8	0.0	0.0	0.0	1,754	5.2	60.1	2.6	78	0.0	7.8	327
Middle Atlantic	8.8	0 0	1.9	0.5	227	4.2	44.9	1.4	108	0.0	2.3	101
East North Central	6.7	0.0	2.5	1.8	296	3.7	41.1	0.0	117	0.0	0.0	167
West North Central	17.9	0.0	0.0	0.0	1,279	4.0	53.7	4.0	171	0.0	0.0	127
South Atlantic	8.2	0.0	16.3	3.3	278	1.6	31.1	1.6	41	0.0	0.0	208
East South Central	0.0	0.0	41.3	0.0	207	0.0	35.4	0.0	30	0.0	0.0	153
West South Central	7.6	0.0	20.3	12.7	645	12.7	68.6	2.5	20	0.0	5.1	89
Mountain	31.8	0.0	7.9	0.0	421	0.0	95.3	0.0	246	0.0	0.0	95
Pacific	14.2	0.0	15.8	1.6	40	4.7	12.7	0.0	74	0.0	3.2	123
Total	9.5	0.0	6.7	1.3	427	4.2	43.3	1.2	99	0.0	1.8	145

TERRITORIES AND POSSESSIONS

Puerto Rico

Notifiable diseases—5 weeks ended March 29, 1947.—During the 5 weeks ended March 29, 1947, cases of certain notifiable diseases were reported in Puerto Rico as follows:

Disease	Cases	Disease	Cases
Chickenpox	65	Poliomyelitis	7
Diphtheria	37	Syphilis	187
Dysentery, unspecified	16	Tetanus	3
Gonorrhea	182	Tetanus, infantile	1
Influenza	115	Tuberculosis (all forms)	888
Malaria	322	Typhoid and paratyphoid fever	23
Measles	2	Whooping cough	42

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended May 3, 1947.—During the week ended May 3, 1947, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox	5	30		164	234	10	21	54	73	591
Diphtheria	2	1		8	1	2			1	15
Dysentery:										
Amebic					3					3
Bacillary				4						4
Encephalitis, infectious								1		1
German measles				40	43	2	19	1	3	108
Influenza		11			1	8			185	205
Measles		23	12	61	208	216	57	99	166	842
Meningitis, meningococcus					3				1	4
Mumps		15		32	349	33	62	13	118	622
Poliomyelitis					1				1	2
Scarlet fever		3	1	63	51	5	1	4	11	139
Tuberculosis (all forms)		11	15	111	22	24	7		36	226
Typhoid and paratyphoid fever		1	2	5	1				6	15
Undulant fever				2	3			1	1	7
Venereal diseases:										
Gonorrhea	4	9	26	124	100	(1)	15	43	75	396
Syphilis	1	14	5	70	78	(1)	6	9	27	210
Other forms						(1)	2			2
Whooping cough		3		32	100	42		24	39	240

1 Report from Manitoba for the above period not received.

CHILE

Santiago—Typhoid fever.—An outbreak of typhoid fever has been reported in Santiago, Chile, as follows: November 3–30, 1946, 100 cases, 6 deaths; December 1–28, 1946, 206 cases, 20 deaths; December 29, 1946, to January 25, 1947, 124 cases, 11 deaths; January 26 to February 22, 1947, 147 cases, 5 deaths, making a total of 577 cases, 42 deaths during the period November 3, 1946, to February 22, 1947.

FINLAND

Typhoid fever epidemic.—Under date of May 14, 1947, typhoid fever was reported to have reached epidemic proportions in several districts of the western coast during recent weeks. The worst outbreak was stated to have occurred in Kalajoki, where between 170 and 180 cases, with 17 deaths, were reported. Numerous cases also occurred in Pori and vicinity. The health authorities state that the outbreak was caused by the contamination of wells resulting from the spring overflow of streams.

JAMAICA

Notifiable diseases—4 weeks ended May 3, 1947.—For the 4 weeks ended May 3, 1947, cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Cerebrospinal meningitis	1		Poliomyelitis		1
Chickenpox	5	8	Puerperal sepsis		1
Diphtheria	2	1	Tuberculosis (all forms)	52	61
Dysentery, unspecified	1	5	Typhoid fever	10	111
Erysipelas	1	1	Typhus fever (murine)	1	
Leprosy		2			

JAPAN

Notifiable diseases—4 weeks ended April 26, 1947, and accumulated totals for the year to date.—For the 4 weeks ended April 26, 1947, and for the year to date, certain notifiable diseases have been reported in Japan as follows:

Disease	4 weeks ended Apr. 26, 1947		Total reported for the year to date	
	Cases	Deaths	Cases	Deaths
Diphtheria	2,800	266	11,923	1,176
Dysentery, unspecified	352	71	1,167	252
Encephalitis, Japanese "B"			1	2
Gonorrhea	15,006		60,048	
Malaria	682	1	2,925	10
Meningitis, epidemic	613	179	1,690	466
Paratyphoid fever	240	11	883	53
Scarlet fever	210	6	794	21
Smallpox	61	9	244	29
Syphilis	10,803		40,738	
Typhoid fever	733	106	3,478	463
Typhus fever	138	16	638	51

NEW ZEALAND

Notifiable diseases—4 weeks ended February 22, 1947.—During the 4 weeks ended February 22, 1947, certain notifiable diseases were reported in New Zealand as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Cerebrospinal meningitis	6		Puerperal fever	5	
Diphtheria	45	3	Scarlet fever	51	
Dysentery, bacillary	10		Trachoma	1	
Erysipelas	10		Tuberculosis (all forms)	192	57
Food poisoning	2		Typhoid fever	5	
Malaria	4		Undulant fever	5	
Poliomyelitis	4				

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

Indochina (French)—Cochinchina.—For the period April 21–30, 1947, 35 cases of cholera, with 28 deaths, were reported in Cochinchina, French Indochina.

Smallpox

China—Formosa (Island of)—Kaohsiung.—For the month of March 1947, 41 cases of smallpox, with 9 deaths, were reported in Kaohsiung, Island of Formosa, China.

Luxemburg—Luxemburg.—On May 10, 1947, 1 case of smallpox (alastrim) was reported in the city of Luxemburg.

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FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

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Public Health Reports

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Public Health Reports

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INCIDENCE OF POLIOMYELITIS IN 1946

By C. C. Dauer, *Epidemiologist, District of Columbia Health Department*

Poliomyelitis in the United States.—During the year 1946 there were a greater number of cases of poliomyelitis reported in the United States than for any prior year except 1916.[1] This was the fourth successive year of relatively high prevalence as slightly more than 25,000 cases were reported in the country as a whole. The total number (70,288) for the past 4 years exceeds the total number of cases (69,456) reported in the 10-year period immediately preceding 1943 as shown in table 1. However, the total number of deaths has been less, for in 1943, 1944, and 1945 there were 45,000 cases with 3,737 deaths while in the 5-year period from 1938 to 1942 there were nearly 32,000 cases with 4,165 deaths.

Table 1.—*Number of poliomyelitis cases and deaths, case and death rates per 100,000 population, and number of cases reported per death in the United States, 1933–46*

Year	Total cases reported	Total deaths registered	Case rate	Death rate	Cases reported per death
1933–37	37,463	4,930	[1] 5.9	[1] 0.8	7.8
1938–42	31,993	4,165	[1] 4.9	[1] .6	7.7
1943	12,449	1,115	9.3	.8	11.1
1944	19,029	1,433	14.3	1.1	13.3
1945	13,619	1,189	10.3	.9	11.4
1946	25,191	----------	19.0	----------	[2] 13.3

[1] Average annual rate.
[2] Based on incomplete reports.

In 1946, as indicated in table 2 and figure 1, the disease occurred in epidemic proportions in the west north central region where every State had relatively or excessively high rates of prevalence. Two adjoining States in the east north central group, Illinois and Wiscon-

[1] All morbidity data for 1946 used in this report are provisional. Data for the United States for prior years are from final reports submitted by States to the U. S. Public Health Service. Data for other countries are those reported or tabulated in Public Health Reports, in the Monthly Epidemiological Report of the Pan American Sanitary Bureau, or in the Epidemiological Information Bulletin, Health Division, UNRRA.

sin, also had a relatively high incidence and likewise in adjacent States in the mountain section, particularly Colorado and Wyoming. Other epidemic areas of lesser extent and generally of much less intensity were in New Hampshire and Vermont, Florida, Alabama, Mississippi, Arkansas, Louisiana, Texas, California, and Washington. Con-

TABLE 2.—*Poliomyelitis morbidity rates per 100,000 population, 1943–46, and number of cases reported per death, 1920–46*

	Morbidity rates				Cases reported per death				
	1943	1944	1945	1946	1920–24	1930–34	1940–44	1945	1946
United States	9.3	14.3	10.3	19.0	3.9	6.8	11.1	11.4	13.3
New England:									
Maine	1.8	2.7	11.3	4.9	4.5	7.5	10.5	12.6	13.0
New Hampshire	3.1	15.0	7.5	40.7	2.7	4.4	7.1	6.8	11.7
Vermont	8.8	13.3	19.3	23.1	6.5	11.8	10.5	15.0	14.8
Massachusetts	6.1	10.6	12.6	9.1	5.5	11.7	18.3	24.0	19.9
Rhode Island	27.2	1.8	1.1	11.9	5.7	14.9	20.1	n. d.	21.5
Connecticut	21.6	12.5	11.9	6.6	4.3	10.4	18.0	17.8	*8.5
Middle Atlantic:									
New York	5.4	48.9	14.4	11.3	5.0	8.5	17.2	20.0	23.3
New Jersey	2.1	13.5	22.7	6.1	4.0	7.0	10.8	9.4	*11.8
Pennsylvania	1.3	15.7	8.5	3.1	2.9	6.1	10.2	14.3	--------
East North Central:									
Ohio	2.7	17.1	6.7	10.4	2.8	6.8	11.5	10.0	12.8
Indiana	3.2	9.9	5.9	12.7	2.1	4.3	8.1	8.1	9.6
Illinois	20.8	7.4	14.3	32.4	4.8	6.7	9.4	11.9	14.9
Michigan	3.2	16.4	3.9	19.7	3.9	8.3	15.3	10.7	12.7
Wisconsin	7.0	9.3	20.2	43.1	3.5	9.1	9.5	11.2	14.2
West North Central:									
Minnesota	4.4	22.1	11.5	115.1	6.1	10.8	11.6	8.0	13.1
Iowa	8.9	9.0	19.1	28.1	2.0	4.6	13.0	12.8	--------
Missouri	5.9	5.3	8.4	35.6	--------	4.1	7.3	6.9	*13.8
North Dakota	4.4	9.9	3.2	88.7	5.7	6.2	13.7	5.7	17.5
South Dakota	2.7	1.5	3.8	71.2	4.6	6.1	10.7	10.5	12.8
Nebraska	12.2	5.5	10.0	53.5	2.9	5.1	6.5	12.0	12.0
Kansas	45.3	6.9	7.4	60.1	3.3	8.0	10.7	7.7	11.1
South Atlantic:									
Delaware	2.5	33.9	10.1	11.1	--------	6.6	16.8	14.5	16.0
Maryland	1.2	25.6	6.0	5.1	5.7	5.9	18.6	16.0	27.5
District of Columbia	1.4	21.5	14.8	3.4	5.8	4.4	12.7	8.7	12.0
Virginia	2.2	27.3	10.9	4.6	4.2	4.2	10.1	16.7	15.8
West Virginia	1.7	12.8	3.8	4.4	--------	4.0	10.1	6.0	--------
North Carolina	1.1	26.7	4.5	4.5	1.1	2.9	10.9	12.2	8.2
South Carolina	1.1	3.1	9.9	1.1	--------	3.3	6.2	10.5	17.0
Georgia	0.9	3.5	4.0	5.3	--------	2.0	11.5	11.6	21.2
Florida	1.4	5.0	6.0	23.9	1.9	1.7	7.9	8.9	14.3
East South Central:									
Kentucky	6.1	30.1	2.6	4.4	1.0	1.7	9.2	6.2	9.3
Tennessee	0.6	4.7	15.2	6.2	--------	2.6	9.2	7.5	--------
Alabama	1.4	3.8	5.4	13.4	2.2	2.8	9.8	7.0	*34.0
Mississippi	1.8	6.4	3.8	16.1	2.5	2.2	8.4	8.0	26.3
West South Central:									
Arkansas	4.4	2.5	3.9	22.6	--------	--------	6.6	5.0	18.3
Louisiana	3.1	6.8	5.5	15.5	1.9	4.7	9.7	10.4	17.3
Oklahoma	30.0	2.7	9.8	19.8	--------	2.1	9.5	14.3	12.3
Texas	20.3	3.8	14.7	14.4	--------	1.7	5.5	7.4	9.6
Mountain:									
Montana	5.5	8.3	17.9	28.1	6.9	10.3	6.8	8.2	18.1
Idaho	3.2	3.2	4.8	9.6	--------	6.7	16.0	6.0	48.0
Wyoming	13.1	4.2	9.7	50.0	4.5	20.0	6.7	12.0	15.2
Colorado	27.1	6.0	13.0	80.9	1.8	4.0	7.1	7.7	16.8
New Mexico	15.7	4.7	4.7	31.0	--------	2.6	6.5	n. d.	18.4
Arizona	24.0	6.0	4.0	17.3	--------	4.5	9.1	8.3	12.2
Utah	68.3	4.2	41.3	23.1	--------	--------	15.8	12.1	15.3
Nevada	16.0	7.6	6.8	10.0	--------	5.0	4.5	5.5	5.3
Pacific:									
Washington	18.4	10.7	15.9	24.9	3.9	9.8	10.4	11.9	16.7
Oregon	35.2	20.4	5.7	12.9	4.0	4.7	13.3	17.2	19.4
California	34.2	6.2	10.3	24.9	4.6	16.1	13.5	15.8	20.8

(--)= data not available.
n. d. =no deaths.
*based on cases and deaths January 1 to November 30.

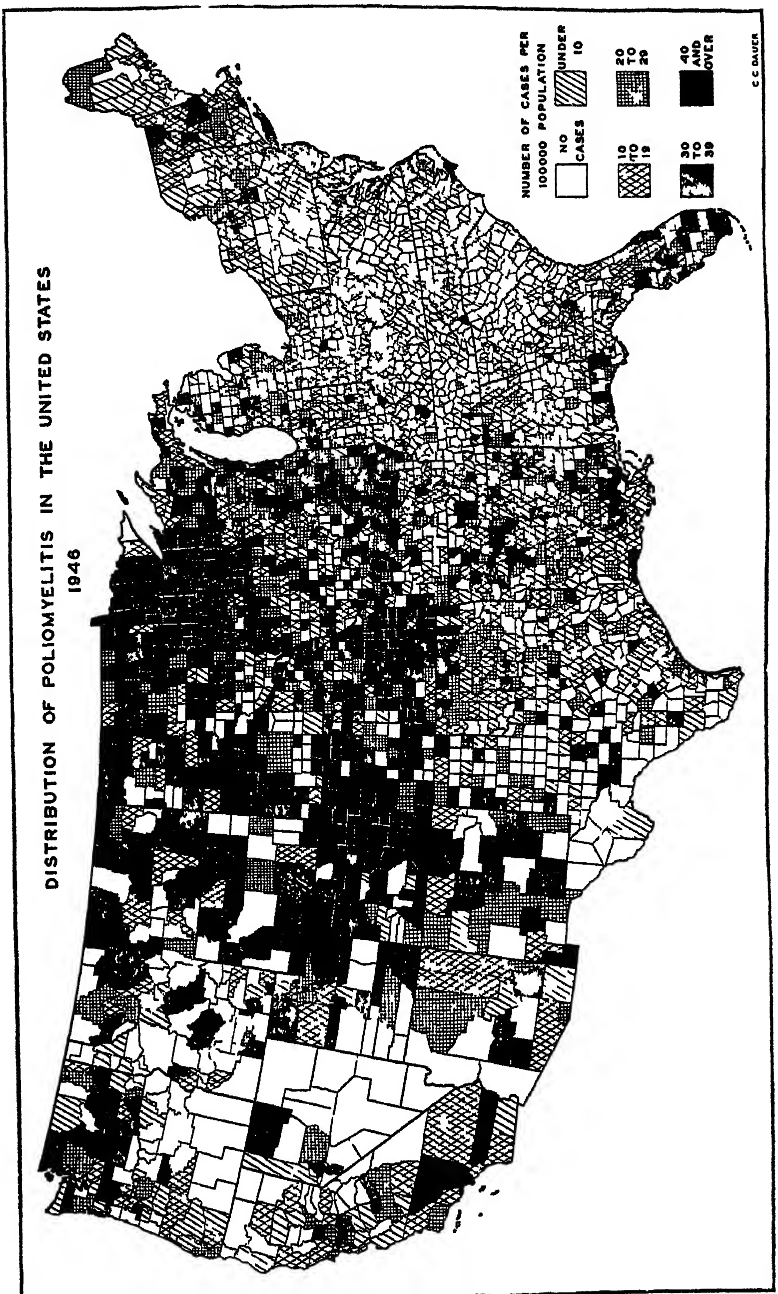
DISTRIBUTION OF POLIOMYELITIS IN THE UNITED STATES
1946
NUMBER OF CASES PER 100000 POPULATION
NO CASES
UNDER 10
10 TO 19
20 TO 29
30 TO 39
40 AND OVER
C C DAUER

FIGURE 1.

sequently it may be said that 1946 was noteworthy in that a large number of cases was reported and the areas involved were extensive.

In each of the West North Central States, Illinois, Wisconsin, New Hampshire, Florida, Arkansas, Colorado, Wyoming, and New Mexico, the incidence rate per 100,000 population was higher than for any previous year. The rate in Minnesota (115.0) has never been exceeded by any State except New York and New Jersey which had rates of 129 and 138 respectively in 1916. Even the rates in North Dakota and Colorado were higher than those previously recorded for any States with the exceptions just noted.

The much higher total number of reported cases of poliomyelitis in the United States in recent years may have resulted from an actual increase in incidence in various localities, or it may have been due in part to a more widespread distribution of the infection each year, or the increase may have been the result of more complete reporting and the inclusion of a greater proportion of nonparalytic cases, or to a combination of these factors. Since three of the past 4 years have been characterized by widespread distribution of the disease, and since there has been a rapid increase in the ratio of reported cases to deaths, it is suggested that these two factors are responsible for much of the apparent increase in total number of cases in recent years.

It is noticeable that there has been a mounting increase in the ratio of cases to deaths in all parts of the country, as shown in table 2. Because the downward trend in poliomyelitis death rates has been slight during the past 30 years, it can be assumed that any marked changes in ratio of cases to deaths are due to factors which affect the reporting of the disease or to a decreasing severity of infection which appears improbable. Southern States scarcely reported more cases than deaths in the 5-year period from 1920 to 1924, while in most other States for which records are available no more than four or five cases were reported for each death. Some sections of the country have shown a consistent rise in the ratio of cases to deaths over a period of years, while in others the change in ratio has taken place recently.

How much of this recent increase in numbers of cases reported is due to the inclusion of a greater proportion of nonparalytic cases is difficult to estimate because only a few States are able to furnish data on paralytic and nonparalytic forms of the disease. In the few States which supplied information for 1946 the percentage of nonparalytic cases included in the total reported varied from 1.8 to 77 percent, and none of the States were in epidemic areas. In 10 cities which reported on types of cases in 1946 the percentage varied from 30 to 67, the higher ratios being reported in cities located in epidemic areas. For instance, three cities in epidemic areas, Minneapolis, Milwaukee, and Omaha, reported 50, 54, and 67 percent respectively

of the total cases as being nonparalytic. In nonepidemic areas, Detroit and New York City reported 31 and 37 percent respectively as being nonparalytic.

In the few States and the District of Columbia from which data were available there was not a very close correlation between the number of cases reported per death and the proportion of nonparalytic cases. One reasonably might expect that where the proportion of nonparalytic cases is large the number of cases reported per death would be correspondingly high. In Louisiana 1.8 percent of cases were reported to be nonparalytic but 17.3 cases per death were recorded, and in Georgia 7.7 were nonparalytic and 21.3 cases per death were reported. On the other hand, Vermont and Michigan reported 62 and 36 percent respectively as being nonparalytic and the numbers of cases per death were 12.7 and 14.8 respectively. These data suggest that the criteria for classifying cases as paralytic and nonparalytic may vary widely in different States or areas or that comparatively few nonparalytic cases which are reported are designated as such in certain States.

Poliomyelitis in other parts of the western hemisphere.—In 1946 there was a high incidence of poliomyelitis not only in the United States but also in several parts of the western hemisphere. In Canada there was greater prevalence, about 2,500 cases being reported or a morbidity rate of 22 per 100,000 population. About 64 percent of the total reported in Canada occurred in the Province of Quebec where the case rate was 48.3. About 20 percent of the total were reported in the Province of Ontario where the case rate was 13.5. The epidemic began early in July in both Provinces and the peak was reached early in September which coincided with the seasonal curve of incidence in northern United States.

Poliomyelitis was more prevalent than usual in the West Indies, Central and South America. The first cases in Cuba occurred in March, one case in each of three provinces, and the peak of the epidemic on the island was reached in June. The disease was most prevalent in the Provinces of Pinar del Rio, Havana, and Santa Clara. The morbidity rate in Cuba in 1946 was about 7.0 per 100,000 population as compared to 10.5 in 1942 when the last previous epidemic occurred. All cases reported were paralytic in type but the case fatality rate was only about 9 percent which was similar to the rate during the outbreak in 1942.

In Puerto Rico there was no increase in numbers of cases until June and the peak of the epidemic was reached in the month of September. A total of about 300 cases was reported in 1946 with a morbidity rate of 16.0 which was more than twice as high as the rate in the last previous epidemic in 1942 when 117 cases (case rate 6.2)

with 7 deaths were reported. Although the disease was prevalent in three of the principal cities on the island, the incidence rates were reported to be higher in the towns and smaller cities.

Mexico also had a greater prevalence of the disease in 1946 than during the past few years as judged by the numbers of cases reported annually. The outbreak began in May and reached a peak in June. A total of 206 cases with 37 deaths were reported between January 1st and October 1st, many of them in Mexico City. Case fatality was about 18 percent.

In Nicaragua a total of 78 cases with 4 deaths was reported from January to November inclusive. During July and August, 40 of the cases occurred in Managua (population 125,000) the capital of the country. The morbidity rate (32.0) was similar to that reported in several cities in the United States.

Venezuela reported an increased incidence during 1946, principally in Maracaibo (population 133,000) where 52 cases were reported during June and July. This city situated not far north of the equator also had as high reported incidence of the disease as certain cities in the United States. In an outbreak of poliomyelitis reported a few years previously in Caracas, Venezuela (estimated population 300,000), there were 122 cases with 15 deaths or a case rate of 41. In this instance the seasonal occurrence was quite different, most of the cases occurring between November 1, 1941, to March 15, 1942.

Argentina reported an increased incidence, 200 cases being reported in Buenos Aires from February to May 1946, inclusive. There was also an increased prevalence in Southern Brazil from January through April. In Colombia 18 cases were reported in one small town.

The above reports would seem to indicate that poliomyelitis outbreaks in tropical regions are not as uncommon as is frequently stated. Other outbreaks have occurred in the West Indies and in Central and South America during the past few years. The Island of Trinidad (1940 population 473,555) reported 136 cases with 18 deaths from October 1941, to April 1942, inclusive. Later in 1942 outbreaks occurred in Cuba, Puerto Rico, and Colombia. Costa Rica and El Salvador had epidemics in 1944.

In addition to these epidemics there have been several reported in tropical regions located in other parts of the world. On the Island of Mauritius which lies just south of the equator and 600 miles east of Madagascar, 1,018 cases, 96 percent of which were paralytic, with 58 deaths were reported from January to May 1945 (*1*). Occasional cases had been seen on the island since 1927 and old cases indicated the presence of the disease as far back as 1891. The 1945 outbreak was a fairly severe one (240 cases per 100,000 population) occurring in an isolated population where the infection has been present in sporadic

form for many years. The distribution of cases with respect to age and sex, and rural and urban distribution was not unlike that found in the southern part of the United States.

On the Island of St. Helena (1939 population 4,622) 122 cases of poliomyelitis with 6 deaths were reported in 1945. No information is available with reference to previous occurrence on the island or on the age distribution of cases but the attack rate of about 2.5 percent suggests that this might have been an epidemic in "virgin soil."

It was also reported that an outbreak of the disease occurred in Singapore which presumably originated in British troops in November 1945, when 22 cases occurred among them. Up to March 1946, 161 cases with 15 deaths were reported among civilians, with 24 additional cases later in the year.

These outbreaks reported from tropical areas have varied widely in intensity as judged by the number of reported cases per 100,000 population but case fatality rates when available usually have been about 10 percent or less. Since most reports include only paralytic cases and considering the fact that reports for many countries are known to be incomplete or include data only for the principal cities it would appear that the assertion is borne out that the disease in tropical areas is milder than in temperate zones. When the data are available they indicate a higher incidence in rural areas and small towns than in the large cities, and an age distribution which is similar to that found in the southern part of the United States.

Spread of poliomyelitis infection.—How the virus of poliomyelitis is disseminated through the population in epidemic and interepidemic periods is still a matter of much dispute, but it appears that the theory of transmission by person to person contact or respiratory spread has been strengthened rather than weakened by recent accumulations of epidemiological data on the disease. Epidemiological evidence of a convincing nature is still lacking, which would suggest waterborne transmission, that insects or arthropods commonly are the means of carrying infection, or that food is the medium by which virus frequently is carried from person to person.

Recent investigations by Howe and his associates (*2*) indicated that in a certain proportion of recognized poliomyelitis cases the virus could be recovered from secretions swabbed from the oropharynx. Recovery of virus was possible only during the period not exceeding 4 days after onset of the disease. These investigators comment on the fact that their methods for recovery of virus were relatively crude, so it is probable that with a more refined technique and the use of more susceptible animals a more frequent harborage of virus in the oropharynx of clinically recognized cases could be demonstrated.

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Kessel and Moore (*3*) have reported the recovery of virus from several pools of tonsils removed from children admitted to Los Angeles hospitals in an interepidemic period. This suggests another fairly substantial reservoir of infection from which dissemination of the virus may occur by means of person to person contact.

Aycock (*4*) in reporting on 49 cases in which there had been limited exposure to a previous case stated that of 17 cases of poliomyelitis with a history of a single exposure 16 fell between the fourth day before and the fifth day after onset of the primary case. In an investigation carried out in Alabama, Casey (*5*) noted that 30 of 36 cases with a single exposure contact took place within the period of 3 days before and 4 days after the onset of the disease in the primary case. He later noted the same high incidence of person to person contacts in Chicago during a nonepidemic year. Similar instances of the disease occurring following a definite exposure just prior to or just after onset are to be found in epidemiological reports on outbreaks by Frost (Iowa, 1909) (*7*), by Perkins (Minnesota, 1930) (*8*), and by Lumsden (Kentucky, 1935) (*9*).

Brown, Francis, and Pearson (*10*) reported finding poliomyelitis virus in the stools of a patient 19 days before onset of paralytic disease. In their epidemiological investigation they found that seven persons, including the patient just mentioned, were intimately exposed to a recognized case during the period of 4 days before to 2 days after onset of the primary case. This group was made up of lodgemates in a summer camp in Michigan in 1944. Five of six stools collected from boys in the lodge 6 days after last exposure contained poliomyelitis virus. Stools and throat washings from boys in other cabins were negative. It seems to be more than coincidence that the only persons having virus in their stools should have had intimate exposure with the primary case during the period of a few days prior to onset and 2 days thereafter.

These observations made by a number of investigators, namely, that transmission of infection does take place in the interval between a few days before to a few days after onset of a case, in conjunction with the findings of Howe that virus can be recovered from the secretions of the oropharynx in a large proportion of cases not longer than 4 or 5 days following onset, is highly suggestive of spread through secretions of the oropharynx. However, it is quite probable that the majority of infections are transmitted by individuals who exhibit no recognizable symptoms, rather than by recognized cases.

The role which the fecal carrier plays in dissemination of poliomyelitis virus is unknown at the present time. However, it can be

stated that outbreaks have not been observed in which it has been proved that they have played a definite part. Furthermore, it has never been demonstrated that a close correlation exists between incidence of the disease or infection and sanitary conditions of the environment either in the home or the community. The concept of spread of infection by transfer of secretions from the oropharynx through person to person contact continues to be the only one which is consistent with observed facts.

Summary.—There was a high incidence of poliomyelitis in the United States in 1946, principally in the north central part of the country.

There has been a mounting increase in ratio of cases to deaths in recent years, which is probably due to more complete reporting and inclusion of a greater proportion of nonparalytic cases.

Poliomyelitis was also more prevalent in other parts of the western hemisphere in 1946.

Epidemics appear to occur more frequently in tropical areas than is commonly stated.

Accumulations of epidemiological data in recent years appear to have strengthened the hypothesis that poliomyelitis is spread principally by person to person contact.

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FLY-ABATEMENT STUDIES IN URBAN POLIOMYELITIS EPIDEMICS DURING 1945[1]

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Poliomyelitis virus has been demonstrated repeatedly in or on flies trapped in epidemic areas in various parts of the country (*1*), (*2*), (*3*), (*4*), (*5*). This has been true of urban as well as of rural epidemics. Furthermore, food exposed to flies at homes of poliomyelitis patients has been shown to become contaminated with virus (*6*). For this reason, it is important to determine whether or not the presence of virus in association with these insects plays a part in the spread of poliomyelitis.

It would be a valuable experiment, for instance, if a sudden, substantial and prolonged reduction in the fly population could be achieved during a poliomyelitis epidemic and within the epidemic area. For this reason, the following experiments were devised. Their object was twofold: First, to determine whether the fly population within cities could be reduced by the methods employed, and second, to determine whether or not such a reduction in flies could be correlated with the course of an epidemic of poliomyelitis.

Plans were drawn with the advice and close cooperation of the United States Public Health Service[2] and others[3]. It was proposed that DDT be used as the fly-abatement measure and that its use be confined to cities. It was further proposed that the work be limited to outdoor application and that it be carried out as a *controlled* study, in which certain areas of a city would be treated with DDT and others left untreated. An effort was made in this experiment to select such areas *early* in the epidemic, and to obtain permission from local authorities to start work as quickly as possible.

Preliminary work was carried out during the latter part of June 1945 in Savannah, Ga.,[4] a nonepidemic area. An attempt was made

[1] From the Section of Preventive Medicine, Yale University School of Medicine, New Haven, Conn. This work was carried out as a project of the Commission on Neurotropic Virus Diseases, Army Epidemiological Board, Preventive Medicine Service, Office of The Surgeon General, U. S. Army. It was aided by a special grant from the National Foundation for Infantile Paralysis, Inc. Substantial aid was also received from the Communicable Disease Center (Atlanta, Ga.), States Relations Division, United States Public Health Service.

[2] It was understood that the Neurotropic Virus Commission should direct the course of this work and evaluate its findings. The U. S. Public Health Service acted in an advisory capacity and also furnished a large part of the material and personnel.

[3] Other agencies which were consulted included the U. S. Army Committee for Insect and Rodent Control, the Office of Scientific Research and Development Committee on Insect Control, the Orlando Station of the U. S. Department of Agriculture, and the Connecticut Agricultural Experiment Station.

[4] Dr. C. Henderson, health officer of Savannah, and George H. Bradley, Senior Entomologist (R), Mark D. Hollis, Sanitary Engineer Director and S. W. Simmons, Sanitarian (R), Communicable Disease Center (Atlanta, Ga.), U. S. Public Health Service, were instrumental in making it possible to carry out this project.

to "blanket" with DDT approximately 1 square mile in the most heavily populated area of the city. The population in this area was about 30,000, the total city population being estimated at 160,000. A Bean orchard sprayer of 600-gallon capacity and having a maximum pressure of 800 pounds per square inch, delivering a maximum of 35 gallons per minute, and mounted on a 2½-ton International truck, comprised the unit used in this experiment. Figure 1 shows the unit in operation in Savannah. One thousand pounds of DDT[5] were applied in the form of a xylene-Triton-water emulsion, containing from 1.3 to 2.5 percent DDT. Seven men worked for 4 days to disperse this material. In the midst of the treatment, the schedule was interrupted by 2.8 inches of rain. Hand spraying was not done. Not until 9 days after the last day of spraying was fly trapping started. At that time, there was no significant difference in the number of flies trapped within or without the sprayed area.

The fly traps which were employed during these experiments were those described and recommended by the United States Department of Agriculture for use in farming communities (*7*). The manner in which they were employed to estimate the fly population has been described in previous publications from this laboratory (*8*), (*9*). Bait consisted of fish plus ripe fruit. Flies were killed by freezing and aliquots were kept frozen until identified.[6]

Further trials were carried out during the early part of July in New Haven, Conn.,[7] where air-blast equipment was adapted for urban spraying of DDT. A modified Bean "Speed Sprayer" is illustrated in action in figure 2. During this period methods were developed for testing the efficiency of the dispersing equipment. Caged flies and petri dishes were exposed at various stations in city blocks. The location of the sample stations in the block, and of the test block itself when a large area was sprayed, was unknown to the spraying operators. After treatment caged flies were observed as a measure of the immediate effect of the spray, and the petri dishes were biologically assayed with freshly trapped flies for residual insecticidal properties at a later date.

[5] This dosage of 1,000 pounds of DDT per square mile was also used in subsequent work carried out in the summer of 1945.

[6] Fly identifications were carried out under the direction of Dr. Maxwell E. Power, Osborn Zoological Laboratory, Yale University. Participating in this and in other parts of the study were Messrs. George Bock, Howard Kriebel, Jan Long, Keith Salmonson, and Ira Wine.

[7] Dr. Joseph I. Linde, health officer of New Haven; Dr Roger B. Friend, Connecticut Agricultural Experiment Station, Mr. Charles Brown and Mr. S. Frederick Potts, New Haven Station of the U. S. Department of Agriculture; and Mr. Walter Norton of the John Bean Manufacturing Co., Lansing, Mich., assisted in these trial applications. We are indebted to the New Haven Park Department and to the Connecticut Agricultural Experiment Station for the loan of trucks and apparatus.

EPIDEMIC STUDIES

During July and August two field experiments were carried out in poliomyelitis areas. Considerable difficulty was encountered in selecting satisfactory locations for these studies. The plan was to select a city in which an epidemic appeared to be developing, then to divide the city into two sections, and to proceed with operations in one section. The untreated part was to serve as a control for determining the normal fly population and the incidence of poliomyelitis in the city. Relatively little difficulty was encountered in obtaining the cooperation of the health officer, but about 2 weeks were required for discussion either by local groups or others, and for assembling equipment, materials, and personnel.

New Jersey test.—During July the incidence of poliomyelitis in Passaic County, N. J., increased with a fairly concentrated epidemic focus in the eastern part of the county at the Clifton-Passaic boundary. It was decided that the city of Paterson,[8] lying to the north, might become a suitable area for the experiment, since it was not seeded as extensively with cases. For the geography of the area, see figure 4.

Paterson occupies 8 square miles, of which 4 square miles (wards 1, 2, 3, 4—indicated in figure 4) were treated with 2½ tons of DDT (2 pounds per acre). This project required the services of 12 men, some working for only 1 week, and others working for 5 weeks.[9] The actual days in which spraying operations were carried out is indicated in table 1. The 1940 population of the treated area was 67,276; that of the remaining 4 square miles of the city which served as the control area was 72,380.

In addition to dispersing a 5-percent-DDT emulsion with air-blast equipment from trucks (see figure 2), much effort was expended in treating the garbage dumps in every yard with a 10-percent-DDT emulsion. (See fig. 3). This proved an arduous and time-consuming task, but was successful in applying DDT at strategic points.

The result of the treatment on the fly population as measured in two of the wards is indicated in figure 5. Definite fly reduction lasting a few days was achieved in all wards. Moreover, when an area (ward 2) was retreated 9 days after the first spraying, it was possible to maintain the fly population at 10 to 25 percent of its normal level

[8] Dr. Frederick P. Lee, health officer of Paterson, cooperated generously in this project.

Besides the local city and State health departments, the following people and agencies were interested in these experiments, and it was found important to consult with all of them:

(1) Commanding officer and chief surgeon, Regional Service Command, U. S. Army.

(2) Medical Director, U. S. Public Health Service District Office.

(3) Local and State mosquito-control agencies.

(4) Local and State fish and game commission.

[9] Guy M. Boatright and Bernard D. Smith, Engineering Aides, of the U. S. Public Health Service Laboratory, Savannah, Ga., participated in all phases of the work in Paterson.

FIGURE 1. Bean orchard sprayer operating in Savannah, Ga. DDT is being applied from four nozzles each controlled by an operator. The distance traversed by the spray is dependent upon the output; consequently, it was necessary to work at a maximum delivery of about 35 gallons per minute with a dilute DDT emulsion (1 to 2 percent).

FIGURE 2. Bean Speed Sprayer operating in Paterson, N. J. This air blast apparatus is powered by a 100 horsepower motor, which generates 12,000 cubic feet of air per minute. DDT in varying amounts may be placed in the air current. It was customary to use a 5 percent emulsion in this machine.

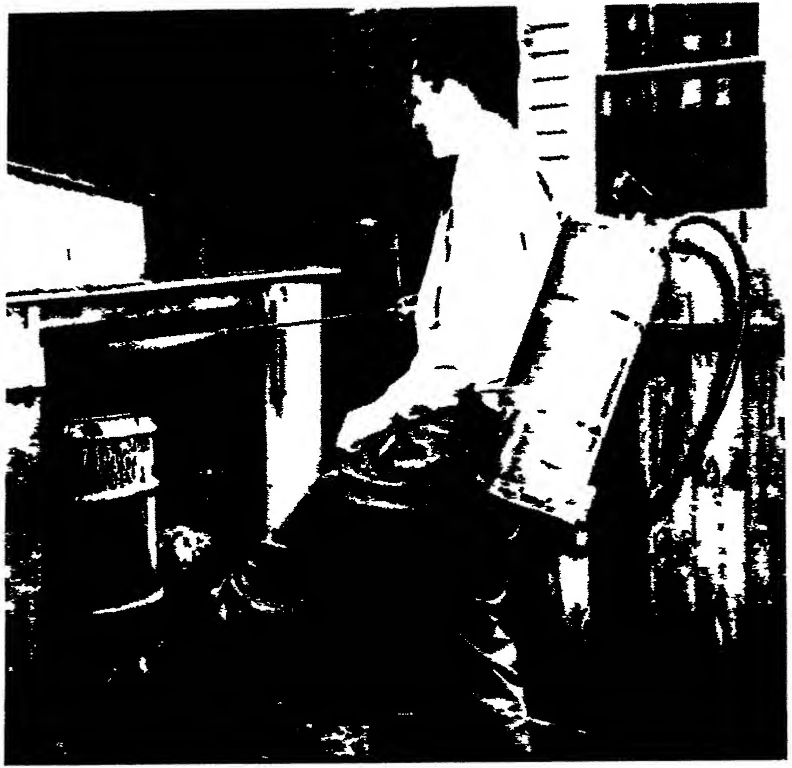

FIGURE 3 —Application of DDT by hand sprayer at a backyard garbage dump in Paterson, N J

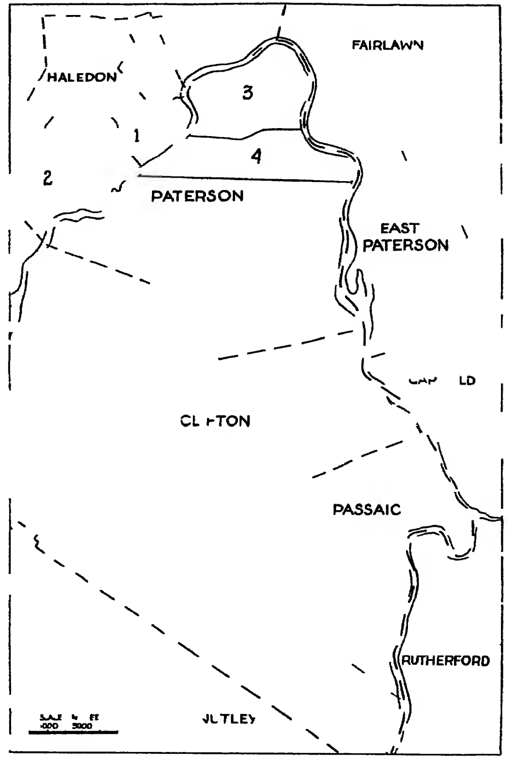

FIGURE 4 —Passaic County N J The epidemic in early July was concentrated in the eastern part of Clifton and in the northern part of Passaic Although the epidemic spread north into Paterson, the cases there were not large in number (see table 2) Area of Paterson=8 square miles Treated area (wards 1 2 3 4)=4 square miles

TABLE 1.—*Average number of flies per trap* [1] *in Paterson in relation to spraying operations*

Date	Ward 3		Ward 2		Ward 1		Ward 4		Control ward
July 25	257		137						137
July 26		DDT [a2], [b3]							
July 27		DDT [a], [b]							
July 28		DDT [a], [b]							
July 29		DDT [a], [b]							
July 30	39	DDT [b]	172						172
July 31		DDT [b]							
Aug. 2	99		851		42		310		290
Aug. 3	245		458						
Aug. 7	266		338	DDT [b]	348		429		350
Aug. 8				DDT [a], [b]					
Aug. 9	342		42	DDT [a], [b]		DDT [a], [b]			410
Aug. 10				DDT [a]		DDT [a], [b]		DDT [a]	
Aug. 11						DDT [b]		DDT [a]	
Aug. 12	118		27		128			DDT [a]	470
Aug. 13							207		499
Aug. 14	208		16		117			DDT [a]	188
Aug. 16		DDT [c4]						DDT [a]	
Aug. 17		DDT [c]		DDT [a]			62		1,290
Aug. 18		DDT [c]		DDT [a]		DDT [a]			
Aug. 19	129	DDT [c]	59	DDT [a]	24				1,100
Aug. 20							359		1,040
Aug. 22	271		131		95		734		925
Aug. 26	172		122		123		186		343
Aug. 29	230		41		67		265		367
Aug. 31	77		315		310		793		214

[1] Approximately 10 traps were set out per square mile. An attempt was made to pick similar sites about homes in both the sprayed and control areas. When trapping and DDT treatment were carried out on the same day in one ward, these operations were done in different sections of the ward.
[2] DDT [a] = DDT applied by power sprayers. (See figs. 1 and 2.)
[3] DDT [b] = DDT applied at garbage areas by hand. (See fig. 3.)
[4] DDT [c] = DDT applied by thermal aerosol generator (venturi). The generator was kindly made available by Dr. R. I. Rice and Dr. H. F. Johnstone, University of Illinois, Urbana, Ill.

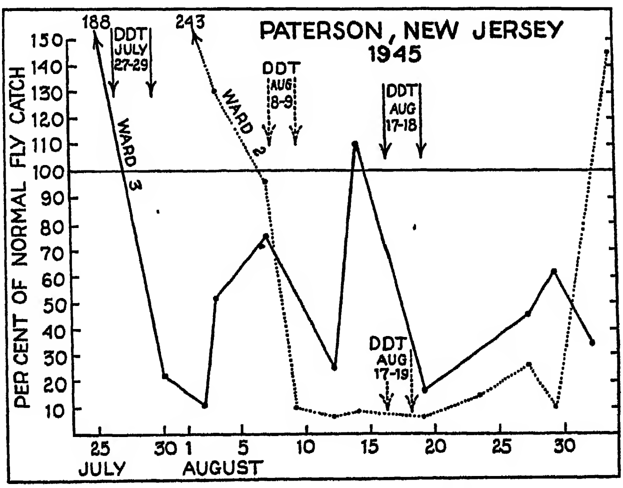

FIGURE 5.—Fly abatement produced in wards 2 and 3 of Paterson, N. J., by application of DDT as indicated. Prolonged fly control for 20 days was achieved by retreatment of ward 2 before the fly population overcame the effects of the first spraying.

for a period of 20 days. Particularly successful results on fly abatement were obtained at a housing project, made up of several two- and three-story buildings scattered over 18 acres and inhabited by 299 families with an estimated population of 1,200. Intensive treat-

ment, not only with DDT, but with a larvicide, orthodichlorobenzene, resulted in good control for the entire month of August. (See fig. 6.)

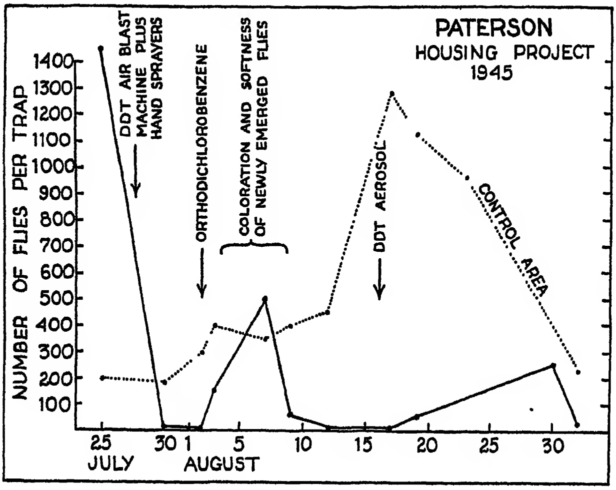

FIGURE 6.—Intensive application of DDT and larvicide (orthodichlorobenzene) at housing project resulted in good fly abatement for an entire month. The flies which were trapped soon after the spraying were newly emerged from pupa which had been buried in the ground at the time of spraying.

The case rate of poliomyelitis, by date of onset, in Paterson is shown in figure 7. In evaluating the spray effect, all cases having their onset before August 17 are considered to have been in the incubation period during the spraying period of July 26 to August 19, and there-

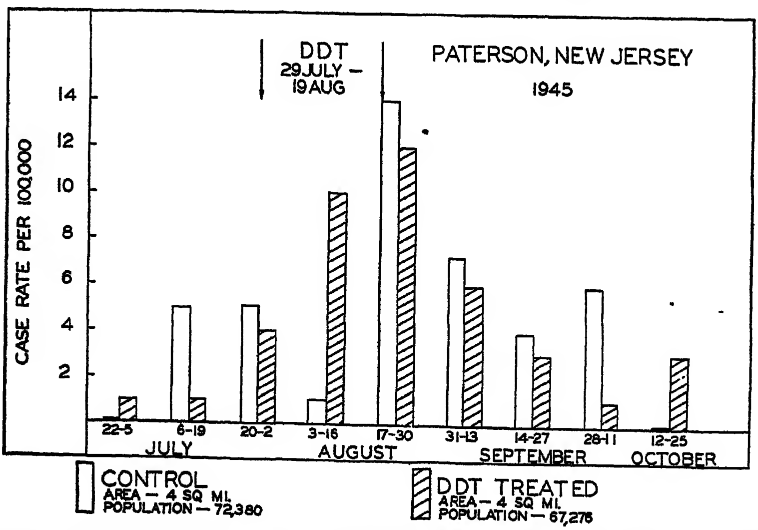

FIGURE 7.—Poliomyelitis in Paterson, N. J. No effect of the DDT spraying can be seen on the course of the epidemic.

fore not subject to the possible effect of DDT. A total of 62 cases was reported in the city of 140,000, with a case rate of 44 per 100,000. Before August 17, the case rate in the area later sprayed was 18 per 100,000; in the control area it was 15. After August 17, the rate in the sprayed area was 25 per 100,000, in the control area, 30. Only 39 actual cases developed in Paterson after August 17; 17 in the sprayed, and 22 in the control area. (See table 2.) One case of poliomyelitis occurred on August 21 in the housing project referred to above.

TABLE 2.—*Poliomyelitis in Paterson, N. J.*[1]—*1945*

Date	Cases in sprayed wards 1, 2, 3, 4		Control area in city	
	Actual number	Rate per 100,000	Actual number	Rate per 100,000
June 22 to July 5	1	1	0	0
July 6 to July 19	1	1	5	7
July 20 to Aug. 2	3	4	5	7
Aug. 3 to Aug. 16	7	10	1	1
Aug. 17 to Aug. 30	8	12	10	14
Aug. 31 to Sept. 13	4	6	5	7
Sept. 14 to Sept. 27	2	3	3	4
Sept. 28 to Oct. 11	1	1	4	6
Oct. 12 to Oct. 25	2	3	0	0
Population	67,276		72,380	
Area, square miles	4		4	
Rate per 100,000 before Aug. 17	18		15	
Rate per 100,000 after Aug. 17	25		30	

[1] Total cases for Paterson: 62 per 140,000 or 44 per 100,000.

Illinois test.—A second experiment was carried out in the city of Rockford, Winnebago County, Ill.,[10] in the latter part of August. The city of Rockford is inhabited by 85,000 people; its area is 12 square miles. In contrast to Paterson, which is part of a large metropolitan area, Rockford is surrounded by farmsteads. When spraying operations were started on August 23, the epidemic was uniformly spread throughout the city and had passed its peak. (See fig. 10.) The 4-square-mile area (27,215 population), in the northwestern part of the city, outlined in figure 8, was sprayed with 2 tons of DDT from August 23 to 28 by means of Bean orchard sprayers similar to those used in the Savannah rehearsal. Rain fell intermittently for 5 days after the spraying, as follows: August 28, 0.25 inch; August 29, 0.65 inch; August 31, 1.70 inches; September 1, 0.33 inch. It was not practical to move equipment from New Jersey, even though it was felt the latter equipment was better suited for this

[10] Dr. N. O. Gunderson, health officer of Rockford, cooperated generously in this project. Medical Director F. V. Meriwether, Director, District No. 3, U. S. Public Health Service, was also instrumental in making this project possible.

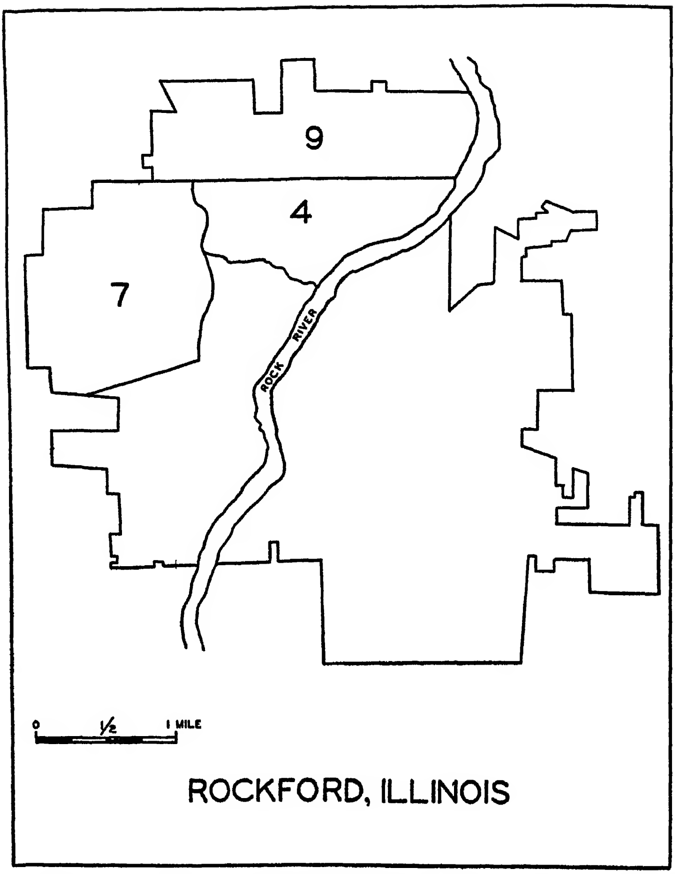

FIGURE 8.—Rockford, Ill. Cases were reported uniformly throughout the city. Wards 4, 7, and 9 in the northwestern part of the city were treated with DDT. The region surrounding Rockford is rural in character. Area of Rockford equals 12 square miles. Treated area equals 4 square miles.

type of work. No hand spraying was attempted in Rockford.[11] Eleven men required 6 days to apply the 5-percent-DDT emulsion at a level of 1.5 pounds per acre. Fly trapping was started at the time of the spraying operations and was continued for an additional month. This necessitated the employment of two additional men.

The result of the treatment in two of the wards is shown in figure 9. Fly reduction for 5 days was achieved in ward 9; no significant abatement was noticed in ward 4. Results in ward 7 were of an intermediate nature. The actual fly catches for the sprayed and control areas of the city are given in table 3.

[11] A preliminary experimental spraying by airplane of an area (ward 9) in the northern part of the city on August 19, indicated that this was a difficult technique to carry out under the conditions of the experiment. The amount of DDT applied by plane was 0.3 pound per acre and was one-fifth the dose applied by the ground crews. Col. R. Lee, Medical Corps, A. A. F., was instrumental in making the use of the plane available.

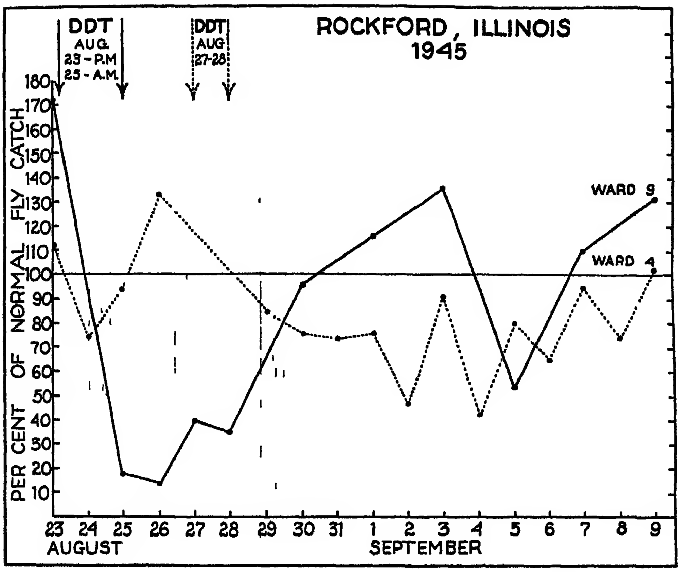

FIGURE 9.—Results of DDT treatment of fly population in wards 4 and 9, Rockford, Ill. Fly reduction for a few days was present in ward 9, but none was demonstrable in ward 4. No hand spraying was attempted here.

TABLE 3.—*Average volume in cubic centimeters of flies per trap in Rockford in relation to spraying operations* [1]

Date	Ward 4		Ward 7		Ward 9		Controls
Aug. 20	-----	-----	250	-----	130	-----	-----
Aug. 21	-----	-----	158	-----	54	-----	-----
Aug. 22	126	-----	163	-----	114	-----	-----
Aug. 23	116	-----	216	-----	179	DDT	104
Aug. 24	208	-----	173	-----	-----	DDT	282
Aug. 25	82	-----	95	DDT	16	-----	88
Aug. 26	195	-----	93	-----	22	-----	148
Aug. 27	-----	DDT	-----	DDT	29	-----	48
Aug. 28	24	DDT	3	-----	13	-----	36
Aug. 29	27	-----	24	-----	-----	-----	35
Aug. 30	26	-----	-----	-----	37	-----	39
Aug. 31	32	-----	66	-----	-----	-----	51
Sept. 1	34	-----	-----	-----	61	-----	53
Sept. 2	14	-----	24	-----	-----	-----	29
Sept. 3	61	-----	-----	-----	89	-----	66
Sept. 4	30	-----	44	-----	-----	-----	69
Sept. 5	81	-----	-----	-----	53	-----	100
Sept. 6	45	-----	100	-----	-----	-----	69
Sept. 7	73	-----	-----	-----	85	-----	77
Sept. 8	43	-----	90	-----	-----	-----	58
Sept. 9	64	-----	-----	-----	83	-----	63
Sept. 10	10	-----	18	-----	-----	-----	12
Sept. 11	17	-----	-----	-----	25	-----	36
Sept. 12	10	-----	15	-----	-----	-----	13
Sept. 13	10	-----	-----	-----	11	-----	11
Sept. 14	10	-----	13	-----	-----	-----	14
Sept. 15	19	-----	-----	-----	18	-----	24
Sept. 16	15	-----	19	-----	-----	-----	20
Sept. 17	29	-----	-----	-----	36	-----	30

[1] Approximately 10 traps were set out per square mile. An attempt was made to pick similar sites about homes in both the sprayed and control areas. When trapping and DDT treatment were carried out on the same day in one ward, these operations were done in different sections of the ward.
DDT was applied by 2 Bean high-pressure sprayers similar to the one in fig. 1.

TABLE 4.—*Poliomyelitis in Rockford, Ill.*[1]*—1945*

Week of—	Total cases in Winnebago County	Cases in sprayed wards, 4, 7, 9		Control area in City	
		Actual number	Rate per 100,000	Actual number	Rate per 100,000
July 1	2	0	0	2	4
July 8	0	0	0	0	0
July 15	4	0	0	1	2
July 22	10	0	0	8	14
July 29	40	5	18	15	26
August 5	62	6	22	26	45
August 12	64	19	70	21	37
August 19	40	9	33	17	30
August 26	32	6	22	11	19
September 2	16	3	11	7	12
September 9	16	4	15	9	16
September 16	11	4	15	6	11
September 23	8	0	0	5	9
September 30	6	1	4	2	4
October 7	4	1	4	3	5
October 14	3	0	0	2	4
October 21	1	0	0	1	2
October 28	0	0	0	0	0
November 4	1	0	0	0	0
November 11	1	0	0	0	0
Total	321	58	----------	136	----------
Population		27,215		57,422	
Area, square miles		4		8	
Rate per 100,000 before September 9		177		194	
Rate per 100,000 after September 9		37		49	

[1] Total cases for Rockford: 194 per 85,000 or 228 per 100,000.

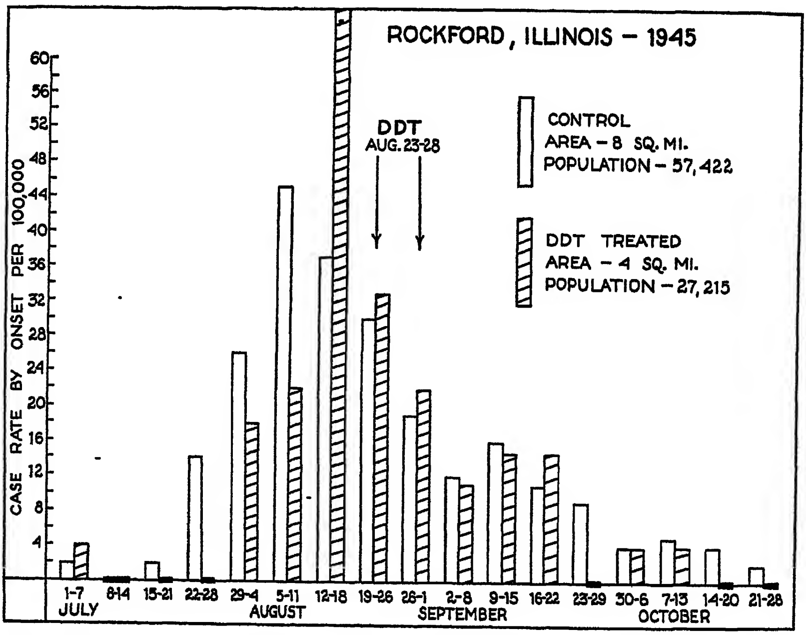

FIGURE 10.—Poliomyelitis in Rockford, Ill. No effect of the treatment can be seen on the course of the epidemic.

The case rate of poliomyelitis by date of onset is presented in table 4 and in figure 10. In evaluating the results of the spraying, all cases with an onset before September 9 are regarded to have been in the incubation period before or during the spraying period. A total of 194 cases occurred in Rockford, of which only 38 had their onset after September 9. Of these, 10 were in the sprayed area and 28 were in the control area. The case rate per 100,000 before September 9 was 177 in the sprayed and 194 in the control area; after September 9 the case rate dropped to 37 per 100,000 in the sprayed, and 49 in the control area.

The estimated cost of these experiments was $12,000 for Paterson and $7,000 for Rockford, exclusive of airplane spraying. The number of man-hours required to carry them out was 2,850 for Paterson and 1,550 for Rockford. The figures given are of necessity approximations in view of the fact that much effort was spent in evaluating various types of equipment, some of which was rented by the commission and some of which was loaned to it.

Some damage to property was caused by the spraying operations. This consisted chiefly of the contamination of outdoor goldfish ponds in gardens, with the resultant death of the fish. By and large however, complaints were few and no reports of damages to gardens, bee hives, or other forms of plant or insect life were received.

As shown in tables 5 and 6, there was no recognizable effect of the

TABLE 5.—*Principal fly species found in Patterson, N. J.*

Period	July 25 to Aug. 11 [1]			Aug. 12 to Aug. 25 [2]			Aug. 26 to Sept. 7 [3]		
Wards	1 and 4	2 and 3	Control	1 and 4	2 and 3	Control	1 and 4	2 and 3	Control
Number of flies identified	2,025	11,468	3,675	2,730	4,615	1,758	5,191	7,193	2,796
Species	Percentage of total fly population								
Phaenicia sericata	62.5	73.0	64.0	73.0	60.0	66.6	43.3	33.4	41.8
Muscina assimilis	6.5	6.7	7.3	3.1	11.2	6.1	9.6	17.7	10.3
Muscina stabulans	12.2	5.2	11.4	2.3	6.2	5.9	6.2	8.5	17.6
Phormia regina	3.9	3.0	4.3	10.0	4.8	5.4	19.1	10.9	8.1
Lucilia illustris	3.7	3.3	4.2	3.2	5.2	4.9	1.1	1.2	.4
Phaenicia caeruleiviridis	2.1	2.0	3.2	2.1	4.7	4.9	2.4	2.4	.8
Ophyra leucostoma	1.4	1.2	1.9	2.0	1.9	1.9	9.4	7.5	10.0
Sarcophaga spp	1.5	1.9	2.9	1.0	3.4	1.9	2.1	3.6	2.3
Musca domestica	3.1	1.2	1.4	1.0	1.8	.8	1.3	3.4	2.8
Fannia spp	.7	1.1	.9	.4	1.0	.3	2.0	3.8	2.4

[1] The following additional species were found, ranging less than 1.1 percent.
Anthomyia pluvialis, *Bufolucilia silvarum*, *Calliphora erythrocephala*, *Camptoneura picta*, *Chaetopsis*, sp., *Chrysomyza demandata*, *Cochliomyia macellaria*, *Euxesta notata*, *Graphiomyia maculata*, *Hylemya* spp., mosquitoes, *Ophyra aenescens*, *Platycoenosia* spp., *Pollenia rudis*, *Rivellia* sp., *Syrphidae*, *Tipulidae*, and unidentified species.

[2] The following additional species were found, ranging less than 0.6 percent:
Anisophus alternatus, *Bufolucilia silvarum*, *Calliphora erythrocephala*, *Camptoneura picta*, *Chaetopsis* sp., *Chrysomyza demandata*, *Cochliomyia macellaria*, *Drysophila* sp., *Euxesta notata*, *Hylemya* spp., *Lonchaea polita*, mosquitoes, *Ophyra aenescens*, *Platycoenosia* spp., *Pollenia rudis*, *Syrphidae*, and unidentified species.

[3] The following additional species were found, ranging less than 3.0 percent:
Anthomyia pluvialis, *Bufolucilia silvarum*, *Calliphora erythrocephala*, *Calliphora vomitoria*, *Camptoneura picta*, *Chaetopsis* sp., *Chrysomyza demandata*, *Cochliomyia macellaria*, *Drysophila* sp., *Euxesta natata*, *Cynomyopsis cadaverina*, *Graphiomyia maculata*, *Hylemya* spp., *Lonchaea polita*, mosquitoes, *Ophyra aenescens*, *Platycoenosia* spp., *Pollenia rudis*, *Stomoxys calcitrans*, *Syrphidae*, *Tipulidae*, and unidentified species.

TABLE 6.—*Principal fly species found in Rockford, Ill.*

Period	Aug. 20 to Sept. 1 [1]				Sept. 2 to Sept. 15 [2]				Sept. 16 to Sept. 29 [3]				Sept. 30 to Oct. 10 [4]			
Wards	9	7	4	Control	9	7	4	Control	9	7	4	Control	9	7	4	Control
Number of flies identified	6,599	4,562	6,038	6,436	5,528	6,960	5,879	7,045	6,035	6,960	6,037	5,978	5,046	4,234	4,243	5,237
Species	Percentage of total fly population															
Phaenicia sericata	22.5	29.1	17.8	28.0	26.2	26.9	15.6	25.5	31.6	23.8	11.4	18.7	22.2	21.8	16.6	23.1
Phormia regina	34.5	14.4	21.7	17.3	29.2	21.2	25.3	22.2	25.3	15.0	23.9	16.2	25.5	23.2	25.6	16.9
Ophyra leucostoma	15.3	16.2	22.3	16.1	16.4	17.5	28.1	18.2	11.6	21.0	24.0	19.4	6.1	2.7	4.7	3.1
Musca domestica	3.9	13.9	3.2	3.2	2.6	5.1	1.5	2.5	2.0	4.2	.7	1.5	1.3	.8	.7	1.1
Fannia spp.	3.5	4.5	6.9	8.6	4.1	3.7	5.8	6.5	3.6	4.7	5.5	7.8	3.2	2.7	4.2	6.0
Muscina stabulans	6.2	5.4	5.1	5.8	3.6	2.9	3.2	2.8	2.2	2.7	2.2	3.2	1.2	1.2	.8	2.9
Sarcophaga spp.	3.4	3.1	3.6	3.4	3.6	4.2	3.3	3.4	3.0	2.7	1.2	3.0	2.4	3.3	1.6	2.3
Muscina assimilis	3.1	2.7	2.5	3.6	1.1	2.1	1.7	2.2	.9	2.4	1.0	1.7	1.0	1.5	1.0	1.6
Phaenicia caeruleiviridis	1.4	2.3	4.0	2.8	2.9	3.3	4.3	3.5	3.9	3.3	3.4	4.7	1.4	2.2	2.1	.7
Lucilia illustris	1.6	2.2	2.1	2.1	3.1	3.6	1.7	2.7	3.4	3.4	2.4	2.7	3.5	5.3	3.2	3.2
Calliphora erythrocephala	1.8	.9	2.5	1.5	2.8	2.5	4.3	3.5	4.4	4.1	8.3	6.8	9.1	12.6	12.7	15.9
Cynomyopsis cadaverina	0	0	0	0	0	0	0	0	1.0	.6	.6	.8	10.4	11.3	12.5	7.6
Platycoenosia spp.	.6	.7	1.5	1.2	1.0	1.5	2.1	1.3	2.2	3.1	5.5	4.6	3.6	3.6	6.3	3.8
Bufolucilia silvarum	1.1	1.6	1.0	2.5	1.6	3.3	1.1	2.6	3.6	4.9	2.3	2.6	4.4	4.2	1.8	2.9
Anthomyids	0	0	0	0	0	0	0	0	1.4	2.2	5.4	4.2	3.0	1.7	4.4	3.0

[1] The following additional species were found ranging less than 0.9 percent: *Calliphora erythrocephala, Bufolucilia silvarum, Platycoenosia* spp., *Pollenia rudis, Protophormia terrae-novae, Hylemya* spp., *Euxesta notata, Chrysomyza demandata, Cochliomyia macellaria, Drosophila* spp., *Camptoneura picta, Calliphora vomitoria, Lonchaea polita, Calliphora viridescens, Scatophaga* spp., *Stomoxys calcitrans, Cynomyopsis cadaverina*, Syrphidae (fam.), *Graphiomyia maculata, Myospila meditabunda*, unidentified species.

[2] The following additional species were found ranging less than 0.8 percent: *Bufolucilia silvarum, Muscina assimilis, Platycoenosia* spp., *Pollenia rudis*, unidentified species *Hylemya* spp., mosquitoes, *Protophormia terrae-novae, Lonchaea polita, Cochliomyia macellaria, Euxesta notata, Scatophaga* spp., *Camptoneura picta, Chrysomyza demandata, Calliphora viridescens, Calliphora vomitoria*, Syrphidae (fam.), *Anthomyia pluvialis, Ophyra aenescens, Stomoxys calcitrans, Cynomyopsis cadaverina, Drosophila* spp., *Myospila meditabunda, Graphiomyia maculata, Chaetopsis* spp., *Helina* spp., and *Morellia micans*.

[3] The following additional species were found ranging less than 0.4 percent: *Muscina stabulans, Sarcophaga* spp., *Musca domestica, Muscina assimilis, Cynomyopsis cadaverina, Pollenia rudis*, unidentified species, *Calliphora vomitoria, Lonchaea polita, Protophormia terrae-novae, Calliphora viridescens, Hylemya* spp., *Cochliomyia macellaria Scatophaga* spp., *Chrysomyza demandata, Euxesta notata, Stomoxys calcitrans, Camptoneura picta, Syrphidae, Drosophila* spp., *Ophyra aenescens, Graphiomyia maculata, Anthomyia pluvialis, Myospila meditabunda, Morellia micans* and *Chaetopsis*, and mosquitoes.

[4] The following additional species were found ranging less than 0.6 percent: *Sarcophaga* spp., *Phaenicia caeruleividis, Muscina stabulans, Muscina assimilis, Musca domestica, Calliphora viridescens, Lonchaea polita, Scatophaga* spp., *Hylemya* spp., *Protophormia terrae-novae, Euxesta notata, Calliphora vomitoria, Cochliomyia macellaria*, Syrphidae (fam.), *Anthomyia pluvialis, Pollenia rudis, Camptoneura picta, Stomoxys calcitrans, Chrysomyza demandata, Anisopus marginatus, Morellia micans, Myospila meditabunda*, unidentified species.

spraying on the relative incidence of any one species of fly.[12] The incidence of a given species fluctuated in a similar manner in the sprayed and control wards, in both Paterson and Rockford. These were probably seasonal fluctuations, approximating those noted in previous studies of normal fly populations (*8*), (*9*).

It is recognized that, inasmuch as a widespread application of DDT was made, it is quite possible that insects other than flies may also have been reduced in number during the experimental period. However, no extensive study was made of this feature.

SUMMARY

DDT was applied in two poliomyelitis epidemic areas, each with an area of about 4 square miles and inhabited by some 67,000 and 27,000 people, respectively. A temporary reduction in flies was achieved in both areas. Under the circumstances, which were not ideal, there was no effect on the poliomyelitis epidemic in either area.

These studies should be regarded as preliminary attempts to answer the question of the role of fly abatement in poliomyelitis control. They serve to indicate some of the difficulties and costs involved in large-scale work of this nature. That they did not answer successfully the major question either in a positive or negative direction was due to the following facts: (1) Poliomyelitis rates in Paterson, N. J., were hardly at the epidemic level, (2) spraying in Rockford, Ill., did not commence until *after* the outbreak had passed its peak, and (3) striking and prolonged fly control was not achieved. The inconclusive results obtained in this work can not be accepted, therefore, as a final answer to the question.

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[12] Separate species of flies trapped in Rockford are being tested for poliomyelitis virus by monkey inoculation. The four most prevalent species, *Phaenicia sericata, Phormia regina, Ophyra leucostoma,* and *Musca domestica,* trapped from Aug. 20 through Sept. 1, 1945 when the epidemic was still in force, have been tested, and of these *Phormia regina* alone has yielded positive tests for virus.

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DEATHS DURING WEEK ENDED MAY 24, 1947

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended May 24, 1947	Corresponding week, 1946
Data for 93 large cities of the United States:		
Total deaths	8, 923	8, 878
Median for 3 prior years	8, 878	
Total deaths, first 21 weeks of year	207, 368	205, 145
Deaths under 1 year of age	609	638
Median for 3 prior years	612	
Deaths under 1 year of age, first 21 weeks of year	16, 540	12, 856
Data from industrial insurance companies:		
Policies in force	67, 305, 638	67, 185, 911
Number of death claims	12, 270	11, 564
Death claims per 1,000 policies in force, annual rate	9.5	9.0
Death claims per 1,000 policies, first 21 weeks of year, annual rate	10.0	10.6

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED MAY 31, 1947

Summary

Of the total of 42 cases of poliomyelitis reported for the week, as compared with 33 last week, 144 for the corresponding week last year, and 52 for the 5-year (1942–46) median, only 3 States reported more than 2 cases each—California 18 (last week 10), Texas 5 (last week 5), and Kentucky 4 (last week 0). The total since the approximate average date of low seasonal incidence (week ended March 15, 1947) is 342, as compared with 565 for the corresponding period last year and a 5-year median of 297. During the period since March 15, the 5 States reporting more than 10 cases each are as follows (figures for the same period last year in parentheses): California 111 (63), New York 31 (39), Texas 28 (94), Florida 19 (120), Illinois 14 (18).

Of the diseases listed in the following tables, current and cumulative figures are above the 5-year medians for amebic and unspecified dysentery, tularemia, and whooping cough. The figure to date for undulant fever is 2,292, as compared with 1,860 and 1,967 respectively, for the years 1946 and 1945. Both current and cumulative figures are below the 5-year medians for diphtheria, measles, meningococcus meningitis, scarlet fever, smallpox, typhoid and paratyphoid fever, infectious encephalitis, Rocky Mountain spotted fever, and endemic typhus fever.

Cases of smallpox were reported in only one State (Alabama, 3 cases), 2 cases of anthrax were reported, 1 each in New York and Pennsylvania, 4 cases of infectious encephalitis (3 in Illinois and 1 in Nebraska), and 1 case of leprosy, in Texas.

For the current week 19 cases of Rocky Mountain spotted fever were reported (as compared with 23 for the corresponding week last year and a 5-year median of 23) of which 6 occurred in Maryland and 3 each in Illinois and Oklahoma. The total to date is 82, as compared with 88 for the same period last year.

A total of 8,130 deaths was recorded for the week in 93 large cities of the United States, as compared with 8,923 last week, 8,272 and 8,680, respectively, for the corresponding weeks of 1946 and 1945, and a 3-year (1944–46) median of 8,436. The cumulative figure is 215,498, as compared with 213, 417 for the corresponding period last year.

Telegraphic morbidity reports from State health officers for the week ended May 31, 1947, and comparison with corresponding week of 1946 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1942-46	Week ended—		Median 1942-46	Week ended—		Median 1942-46	Week ended—		Median 1942-46
	May 31, 1947	June 1, 1946		May 31, 1947	June 1, 1946		May 31, 1947	June 1, 1946		May 31, 1947	June 1, 1946	
NEW ENGLAND												
Maine	2	3	0	3	1	1	101	186	113	1	0	2
New Hampshire	0	0	0	2	-------	-------	1	54	50	0	1	2
Vermont	0	0	0	-------	-------	-------	94	121	121	0	0	0
Massachusetts	12	4	4	-------	-------	-------	343	2,266	1,037	0	3	5
Rhode Island	1	0	0	-------	-------	-------	112	140	96	0	1	1
Connecticut	0	5	1	-------	-------	1	823	602	345	1	3	3
MIDDLE ATLANTIC												
New York	14	30	14	[1] 5	(1)	[1] 4	599	3,636	1,144	2	8	18
New Jersey	2	2	2	1	3	2	675	2,388	724	2	4	6
Pennsylvania	8	14	9	[2] -------	[2] -------	[2] -------	180	2,211	949	3	6	17
EAST NORTH CENTRAL												
Ohio	8	12	6	7	1	6	919	973	320	1	2	7
Indiana	4	9	7	1	1	3	75	430	162	2	1	2
Illinois	5	8	8	-------	2	2	175	677	396	2	6	16
Michigan [3]	0	9	6	-------	-------	1	157	845	503	1	3	9
Wisconsin	0	1	1	4	22	22	893	2,493	1,582	2	2	2
WEST NORTH CENTRAL												
Minnesota	2	15	2	1	-------	-------	601	83	275	0	5	0
Iowa	2	10	3	-------	-------	-------	81	500	115	0	2	1
Missouri	1	2	2	1	2	1	96	171	171	1	1	7
North Dakota	1	0	0	-------	-------	1	44	8	11	0	1	0
South Dakota	0	5	1	-------	-------	-------	[illegible]	28	27	0	0	0
Nebraska	1	1	1	2	1	2	30	134	149	0	0	1
Kansas	5	13	4	-------	-------	1	9	117	214	1	1	2
SOUTH ATLANTIC												
Delaware	0	0	0	-------	-------	-------	-------	17	6	0	0	1
Maryland [3]	3	12	6	6	-------	-------	47	596	193	1	2	2
District of Columbia	0	0	0	-------	-------	-------	10	168	88	1	0	1
Virginia	5	8	5	138	72	88	217	708	364	2	2	7
West Virginia	5	3	1	27	6	2	13	63	63	0	2	2
North Carolina	4	11	10	-------	-------	-------	110	338	338	1	5	2
South Carolina	7	1	2	356	123	145	173	325	105	0	0	0
Georgia	1	3	[illegible]	1	5	7	35	143	96	4	1	1
Florida	2	6	2	3	-------	-------	48	135	124	0	5	4
EAST SOUTH CENTRAL												
Kentucky	3	6	2	1	-------	-------	6	80	88	0	0	5
Tennessee	7	2	2	7	15	15	35	104	104	2	1	4
Alabama	9	2	2	46	8	18	213	145	116	5	3	3
Mississippi [3]	7	7	3	4	-------	-------	15	-------	-------	2	2	1
WEST SOUTH CENTRAL												
Arkansas	4	8	2	10	9	7	46	82	77	0	2	1
Louisiana	5	6	2	2	5	1	27	101	35	0	2	3
Oklahoma	2	3	2	34	11	28	2	146	57	1	2	2
Texas	14	[illegible]	[illegible]	[illegible]	313	313	314	1,575	423	5	13	12
MOUNTAIN												
Montana	0	0	0	2	1	4	50	[illegible]	74	0	1	0
Idaho	0	0	0	6	20	-------	32	48	20	0	0	0
Wyoming	0	0	0	2	-------	-------	5	36	36	0	0	0
Colorado	4	13	6	13	3	31	49	478	336	2	0	0
New Mexico	0	1	1	5	3	3	65	54	44	1	0	0
Arizona	1	1	1	49	18	36	74	158	48	0	0	0
Utah [3]	0	0	0	-------	-------	2	4	213	160	0	0	0
Nevada	0	0	0	-------	-------	-------	-------	13	13	0	0	0
PACIFIC												
Washington	3	7	4	1	-------	1	14	262	250	1	8	2
Oregon	0	0	0	8	-------	5	8	214	104	1	0	0
California	11	18	17	20	10	22	207	1,883	1,883	7	7	11
Total	165	290	174	1,097	655	754	7,959	26,347	16,646	55	108	173
22 weeks	5,557	7,496	5,743	[illegible]	185,879	76,059	[illegible]	[illegible]	444,654	1,882	3,608	4,877
Seasonal low week [4]	(27th) July 5-11			(30th) July 26-Aug. 1			(35th) Aug. 30-Sept. 5			(37th) Sept. 13-19		
Total since low	13,123	19,140	14,543	[illegible]	548,127	111,921	165,301	568,570	482,667	2,854	[illegible]	7,329

[1] New York City only.
[2] Philadelphia only.
[3] Period ended earlier than Saturday.
[4] Dates between which the approximate low week ends. The specific date will vary from year to year.

Telegraphic morbidity reports from State health officers for the week ended May 31, 1947, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46
	May 31, 1947	June 1, 1946		May 31, 1947	June 1, 1946		May 31, 1947	June 1, 1946		May 31, 1947 [5]	June 1, 1946	
NEW ENGLAND												
Maine	0	1	0	13	27	27	0	0	0	0	1	0
New Hampshire	0	0	0	1	11	8	0	0	0	0	0	0
Vermont	0	0	0	10	4	14	0	0	0	0	0	0
Massachusetts	0	0	0	91	174	244	0	0	0	1	3	2
Rhode Island	0	0	0	12	1	9	0	0	0	0	0	0
Connecticut	0	0	0	22	28	56	0	0	0	0	1	0
MIDDLE ATLANTIC												
New York	1	4	3	176	381	380	0	0	0	3	2	3
New Jersey	1	0	0	76	98	107	0	0	0	1	1	0
Pennsylvania	0	1	1	209	230	234	0	0	0	11	2	3
EAST NORTH CENTRAL												
Ohio	2	1	0	196	296	296	0	0	0	2	2	1
Indiana	0	1	0	41	55	55	0	3	1	0	2	2
Illinois	2	5	1	53	155	155	0	1	1	5	1	2
Michigan [3]	1	1	0	116	130	130	0	0	0	2	2	0
Wisconsin	0	0	0	51	81	253	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	1	2	1	46	53	53	0	0	0	1	1	1
Iowa	1	3	0	4	42	31	0	0	0	1	0	1
Missouri	0	0	0	27	26	47	0	1	1	1	4	4
North Dakota	0	0	0	0	7	7	0	0	0	0	1	0
South Dakota	0	0	0	2	12	12	0	0	0	0	0	0
Nebraska	0	0	0	11	12	22	0	0	0	0	0	0
Kansas	0	1	0	35	33	42	0	1	1	0	0	0
SOUTH ATLANTIC												
Delaware	0	1	0	3	2	2	0	0	0	0	0	0
Maryland [3]	0	0	0	25	39	73	0	0	0	1	0	1
District of Columbia	0	0	0	4	8	8	0	0	0	0	0	0
Virginia	0	0	0	12	77	30	0	0	0	1	1	1
West Virginia	0	0	0	9	16	17	0	0	0	0	1	1
North Carolina	1	5	2	11	24	24	0	0	0	2	0	2
South Carolina	0	1	1	2	4	6	0	0	0	2	7	4
Georgia	1	0	0	6	10	12	0	1	0	2	3	9
Florida	2	31	3	3	0	3	0	0	0	0	1	3
EAST SOUTH CENTRAL												
Kentucky	4	1	1	14	16	25	0	0	0	4	0	1
Tennessee	0	0	0	16	13	13	0	0	0	1	6	3
Alabama	0	26	3	8	10	9	3	0	0	0	1	2
Mississippi [3]	0	5	1	4	2	3	0	0	0	1	2	3
WEST SOUTH CENTRAL												
Arkansas	0	0	0	2	12	5	0	0	0	4	4	4
Louisiana	0	3	0	6	13	7	0	0	0	3	10	7
Oklahoma	1	3	0	1	10	11	0	0	0	1	0	0
Texas	5	26	6	11	45	45	0	1	0	4	13	10
MOUNTAIN												
Montana	0	2	0	9	5	11	0	0	0	0	0	0
Idaho	0	0	0	7	16	10	0	1	0	0	3	0
Wyoming	0	0	0	2	1	11	0	0	0	0	0	0
Colorado	0	6	0	19	35	36	0	0	0	0	1	2
New Mexico	0	0	0	8	4	4	0	0	0	3	0	0
Arizona	1	0	0	1	11	9	0	0	0	0	1	0
Utah [3]	0	2	0	5	22	13	0	0	0	0	0	0
Nevada	0	0	1	0	3	0	0	2	0	0	0	0
PACIFIC												
Washington	0	1	1	23	21	22	0	7	1	0	2	1
Oregon	0	0	0	9	27	22	0	0	0	0	1	1
California	18	11	5	92	147	147	0	0	0	4	6	4
Total	42	144	52	1,513	2,458	2,841	3	18	8	61	86	83
22 weeks	[6] 969	1,033	590	51,185	75,274	85,312	134	234	248	1,085	1,180	1,321
Seasonal low week [4]	(11th) Mar. 15–21			(32d) Aug. 9–15			(35th) Aug 30–Sept. 5			(11th) Mar. 15–21		
Total since low	342	565	207	80,871	113,845	123,663	188	310	365	600	705	731

[3] Period ended earlier than Saturday.

[4] Dates between which the approximate low week ends. The specific date will vary from year to year.

[5] Including paratyphoid fever reported separately, as follows: Massachusetts 1 (salmonella infection); New York 1; Michigan 1; Iowa 1; North Carolina 1; Georgia 1; Kentucky 1; Oklahoma 1; Texas 2.

[6] The figures for poliomyelitis, and other diseases, are those *reported* during the specific weeks. The figures for the early weeks of the year, therefore, probably include cases which should be charged to the preceding year. For example, the 51 cases of poliomyelitis reported in Michigan to date this year include delayed reports of 17 cases with onsets in 1946.

Telegraphic morbidity reports from State health officers for the week ended May 31, 1947, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Whooping cough			Week ended May 31, 1947							
	Week ended—		Median, 1942–46	Dysentery			Encephalitis, infectious	Rocky Mt. spotted fever	Tularemia	Typhus fever, endemic	Undulant fever
	May 31, 1947	June 1, 1946		Amebic	Bacillary	Unspecified					
NEW ENGLAND											
Maine	19	13	19								1
New Hampshire	4	4	3								
Vermont	1	1	15								2
Massachusetts	100	124	114		2						
Rhode Island	19	9	19								
Connecticut	44	49	35								3
MIDDLE ATLANTIC											
New York	131	131	192	5	1						2
New Jersey	149	88	88								
Pennsylvania	146	180	180	1				1			
EAST NORTH CENTRAL											
Ohio	192	87	110								
Indiana	24	30	30		1			1			
Illinois	70	103	103	3	1		3	3	1		13
Michigan [3]	217	125	125	1	1						3
Wisconsin	149	127	127						1		8
WEST NORTH CENTRAL											
Minnesota	36	22	22			1					3
Iowa	17	27	16								12
Missouri	39	19	19					1			
North Dakota	101		2								
South Dakota	1		3								
Nebraska	6	7	13				1				2
Kansas	31	11	40						1		5
SOUTH ATLANTIC											
Delaware	5										
Maryland [3]	92	7	50			1		6			
District of Columbia	22	10	11	1					1		
Virginia	85	133	64			108					1
West Virginia	17	30	30								
North Carolina	77	109	116	1						1	1
South Carolina	204	31	71	2	14					1	1
Georgia	29	4	37	1	1					2	3
Florida	74	45	21			1				2	
EAST SOUTH CENTRAL											
Kentucky	35	25	34								
Tennessee	42	45	45								1
Alabama	148	31	37	1						6	1
Mississippi [3]	16			1					8		1
WEST SOUTH CENTRAL											
Arkansas	63	2	13	3	1				15		
Louisiana	10	5	2	2	1			1		2	1
Oklahoma	41	7	11	2		2		3	6		2
Texas	782	172	297	22	287	22			1	14	11
MOUNTAIN											
Montana	7	5	5								
Idaho	3	21	6	1							
Wyoming	1	20	3					1	3		
Colorado	4	12	26					1			
New Mexico	24	13	5								
Arizona	53	24	22			12					1
Utah [3]	6	7	33								1
Nevada											
PACIFIC											
Washington	14	43	23		6						1
Oregon	11	25	22					1			1
California	240	96	313	3						2	9
Total	3,601	2,079	2,366	50	316	147	4	19	37	30	90
Same week, 1946	2,079			37	498	248	16	23	16	52	91
Median, 1942–46	2,366			37	483	97	14	23	17	52	[7] 96
22 weeks: 1947	63,311			1,066	6,528	4,242	144	82	681	804	2,293
1946	41,019			858	7,212	2,503	193	88	392	1,015	1,860
Median, 1942–46	54,758			677	6,002	1,643	193	84	387	1,015	[7] 1,914

[3] Period ended earlier than Saturday.

[7] 2-year average, 1945–46.

Anthrax: New York 1 case; Pennsylvania 1 case.
Leprosy: Texas 1 case.

WEEKLY REPORTS FROM CITIES[1]

City reports for week ended May 24, 1947

This table lists the reports from 87 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0	------	0	22	0	2	0	0	0	0	8
New Hampshire:												
Concord	0	0	------	0	1	0	0	0	0	0	0	------
Vermont:												
Barre	0	0	------	0	2	0	1	0	0	0	0	------
Massachusetts:												
Boston	5	0	------	0	82	0	5	0	18	0	0	24
Fall River	0	0	------	0	12	0	0	0	1	0	0	4
Springfield	0	0	------	0	17	0	1	0	0	0	0	5
Worcester	0	0	------	0	35	0	1	0	5	0	0	14
Rhode Island:												
Providence	0	0	------	1	100	0	0	0	4	0	0	21
Connecticut:												
Bridgeport	0	0	------	0	35	0	0	0	2	0	0	------
Hartford	0	0	------	0	108	0	2	0	4	0	0	------
New Haven	0	0	------	0	121	0	0	0	8	0	0	15
MIDDLE ATLANTIC												
New York:												
Buffalo	1	0	------	0	-------	0	6	0	4	0	0	2
New York	12	0	14	0	321	2	42	1	114	0	3	78
Rochester	0	0	------	0	2	1	4	0	13	0	0	12
Syracuse	0	0	------	0	-------	1	2	0	6	0	0	27
New Jersey:												
Camden	1	0	------	0	1	0	1	0	3	0	0	1
Newark	0	0	------	0	8	1	3	0	18	0	0	48
Trenton	0	0	------	0	6	0	2	0	8	0	0	11
Pennsylvania:												
Pittsburgh	0	0	------	0	23	1	8	0	24	0	0	10
Reading	0	0	------	0	4	0	0	0	4	0	0	1
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	0	0	1	1	-------	0	14	0	8	0	1	7
Cleveland	0	0	1	0	187	2	6	0	39	0	0	47
Columbus	0	0	1	1	92	0	1	0	9	0	0	20
Indiana:												
Fort Wayne	0	0	------	0	-------	1	3	0	2	0	0	------
Indianapolis	0	0	------	0	2	0	6	0	11	0	0	35
South Bend	0	0	------	0	16	0	0	0	0	0	0	2
Terre Haute	0	0	------	0	-------	0	2	0	2	0	0	2
Illinois												
Chicago	1	1	1	0	35	2	21	0	32	0	0	24
Michigan:												
Detroit	1	1	------	1	5	2	11	0	60	0	1	112
Flint	0	0	------	0	-------	0	2	1	1	0	0	2
Grand Rapids	0	0	------	0	6	0	2	0	5	0	0	7
Wisconsin:												
Kenosha	0	0	------	0	-------	0	0	0	0	0	0	1
Milwaukee	0	0	1	1	23	0	3	0	14	0	0	24
Racine	0	0	------	0	1	0	0	0	15	0	0	5
Superior	0	0	------	0	1	0	0	0	1	0	0	------
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0	------	0	1	0	0	0	3	0	0	19
Minneapolis	0	0	------	0	67	1	5	0	14	0	0	11
St. Paul	0	0	------	0	702	0	7	0	7	0	0	12
Missouri:												
Kansas City	0	0	------	0	1	0	6	0	9	0	0	9
St. Joseph	0	0	------	0	-------	1	0	0	0	0	0	1
St. Louis	0	0	------	0	38	0	7	0	14	0	0	21

[1] In some instances the figures include nonresident cases.

City reports for week ended May 24, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
Nebraska:												
Omaha	0	0	------	0	------	0	0	0	4	0	0	------
Kansas:												
Topeka	0	0	------	0	8	0	0	0	5	0	0	3
Wichita	1	0	------	0	1	0	1	0	1	0	0	2
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0	------	0	------	0	1	0	2	0	0	2
Maryland:												
Baltimore	4	0	1	0	14	1	5	1	18	0	1	78
Cumberland	0	0	------	0	------	0	0	0	1	0	0	------
Frederick	1	0	------	0	------	0	0	0	0	0	0	------
District of Columbia:												
Washington	0	0	1	0	9	0	4	0	7	0	0	1
Virginia												
Lynchburg	1	0	------	0	1	0	0	0	0	0	0	------
Richmond	1	0	1	1	57	0	1	0	3	0	0	1
Roanoke	0	0	------	0	38	0	0	0	3	0	0	------
West Virginia:												
Wheeling	0	0	------	0	1	0	1	0	1	0	0	------
North Carolina:												
Raleigh	0	0	------	0	2	0	1	0	0	0	0	10
Wilmington	0	0	------	0	1	0	0	0	0	0	0	1
Winston-Salem	0	0	------	0	13	0	0	0	1	0	0	5
South Carolina:												
Charleston	0	0	6	0	11	0	2	0	0	0	0	2
Georgia:												
Atlanta	0	0	------	0	------	0	6	0	1	0	0	2
Brunswick	0	0	------	0	2	0	0	0	0	0	0	3
Savannah	0	0	1	0	2	1	0	0	0	0	0	------
Florida:												
Tampa	0	0	------	0	9	0	0	1	2	0	0	2
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	0	0	------	0	4	0	9	0	2	0	2	22
Nashville	0	0	------	0	------	0	1	0	3	0	2	4
Alabama:												
Birmingham	0	0	------	0	11	0	3	0	0	0	0	2
Mobile	1	0	------	0	3	1	1	0	2	0	0	4
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	------	0	1	0	0	0	0	0	0	6
Louisiana:												
New Orleans	5	0	2	0	11	0	5	0	0	0	1	12
Shreveport	0	0	------	0	------	0	2	0	0	0	0	------
Oklahoma:												
Oklahoma City	0	0	------	0	------		3	0	1	0	0	1
Texas:												
Dallas	0	0	------	0	202	0	1	0	4	0	0	14
Galveston	0	0	------	0	1	0	2	0	0	0	0	------
Houston	1	0	1	0	1	0	1	2	1	0	1	6
San Antonio	2	0	2	1	------	0	1	0	1	0	1	------
MOUNTAIN												
Montana:												
Billings	0	0	------	0	------	0	1	0	2	0	0	------
Great Falls	0	0	------	0	7	0	0	0	0	0	0	1
Helena	0	0	------	0	1	0	0	0	0	0	0	5
Missoula	0	0	------	0	25	0	2	0	0	0	0	------
Idaho:												
Boise	0	0	------	0	------	0	0	0	0	0	0	1
Colorado:												
Denver	2	0	1	0	23	0	2	0	10	0	0	9
Pueblo	0	0	------	0	1	0	2	0	1	0	0	------
Utah:												
Salt Lake City	0	0	------	0	4	0	0	0	3	0	0	2

City reports for week ended May 24, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza: Cases	Influenza: Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
PACIFIC												
Washington:												
Seattle	0	0	-----	0	4	0	2	1	2	0	0	6
Spokane	0	0	-----	0	1	0	1	0	0	0	0	5
Tacoma	0	0	-----	0	9	0	0	0	1	0	0	-----
California:												
Los Angeles	2	0	3	1	14	4	2	1	24	0	0	38
Sacramento	0	0	-----	0	1	0	1	0	1	0	0	3
San Francisco	0	0	-----	0	6	1	5	1	7	0	1	6
Total	42	2	38	8	2,576	23	245	9	506	0	14	901
Corresponding week, 1946*	81	----	24	12	7,844	-----	261	-----	906	0	14	501
Average 1942-46 *	58	-----	39	[2] 13	[3] 4,979	-----	[2] 274	-----	1,134	0	13	720

[2] 3-year average, 1944-46.
[3] 5-year median, 1942-46.
* Exclusive of Oklahoma City.

Dysentery, amebic.—Cases: New York 6; Memphis 1; New Orleans 5; Los Angeles 1.
Dysentery, bacillary.—Cases: New York 2; Detroit 1; Charleston, S. C., 4; Los Angeles 1.
Dysentery, unspecified.—Cases: Cincinnati 11; Raleigh 1; San Antonio 4.
Rocky Mt. spotted fever.—Cases: Indianapolis 1; Washington, D. C., 1.
Tularemia.—Cases: St. Louis 1; Little Rock 1.
Typhus fever; endemic.—Cases: Mobile 1; Little Rock 1; Houston 1.

Rates (annual basis) per 100,000 population, by geographic groups, for the 87 cities in the preceding table (latest available estimated population, 32,495,600)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza: Case rates	Influenza: Death rates	Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
New England	13.1	0.0	0.0	2.6	1,398	0.0	31.4	0.0	110	0.0	0.0	238
Middle Atlantic	7.8	0.0	7.8	0.0	204	3.4	38.1	0.6	109	0.0	1.7	106
East North Central	1.2	1.2	3.1	2.5	226	4.3	43.5	0.6	122	0.0	1.2	177
West North Central	2.0	0.0	0.0	0.0	1,645	4.0	52.3	0.0	115	0.0	0.0	157
South Atlantic	11.7	0.0	16.7	1.7	268	3.3	35.2	3.3	65	0.0	1.7	179
East South Central	5.9	0.0	0.0	0.0	106	5.9	82.6	0.0	41	0.0	23.6	189
West South Central	20.3	0.0	12.7	2.5	549	0.0	38.1	5.1	18	0.0	7.6	99
Mountain	15.9	0.0	7.9	0.0	484	0.0	55.6	0.0	127	0.0	0.0	143
Pacific	3.2	0.0	4.7	1.6	55	7.9	17.4	4.7	55	0.0	1.6	92
Total	6.8	0.3	6.1	1.3	414	3.7	39.4	1.4	96	0.0	2.3	145

PLAGUE INFECTION IN TEXAS AND WASHINGTON

TEXAS

Plague infection was reported proved on May 28 in a pool of 50 fleas from 6 prairie dogs (*Cynomys* sp.) taken May 15 in Dawson County, Texas, 12 miles southwest of Lamesa. This location is about 75 miles southeast of Cochran County, where plague infection was first reported found in ectoparasites from wild rodents in the State in 1946.

WASHINGTON

Pools of fleas from wild rodents in Washington have been reported infected as follows:

Kittitas County.—132 fleas from 70 meadow mice (*Microtus* sp.), 22 fleas from 13 pocket mice (*Perognathus* sp.), 200 fleas from 85 white-footed deer mice (*Peromyscus* sp.), collected May 13; and 16 fleas from 56 meadow mice (*Microtus* sp.), 8 fleas from 26 white-footed deer mice (*Peromyscus* sp.), and 6 fleas from 16 pocket mice (*Perognathus* sp.) collected May 15. All specimens taken at the head of Squaw Creek and proved positive on May 28.

Yakima County.—94 fleas from 87 field mice (*Microtus* sp.), 50 fleas from 2 ground squirrels (*Citellus townsendii*), and 34 fleas from 11 chipmunks (*Eutamias* sp.), all specimens collected on May 9, at a location 2 miles north of area 47–WB–17 Firing Range, 6 miles east of Firing Range Headquarters.

TERRITORIES AND POSSESSIONS

Panama Canal Zone

Notifiable diseases—April 1947.—During the month of April 1947, certain notifiable diseases were reported in the Panama Canal Zone and terminal cities as follows:

Disease	Residence [1]									
	Panama City		Colon		Canal Zone		Outside the Zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox	16		3		5		3		27	
Diphtheria	23		1				4		28	
Dysentery:										
Amebic							2		2	
Bacillary	1				2		2		5	
Malaria [2]	3		3		14		56	3	76	3
Measles	1				6				7	
Meningitis, meningococcus	2		1						3	
Mumps	1						1		2	
Pneumonias		13		3	9	1		4	[3] 9	21
Poliomyelitis			1				1		2	
Tuberculosis		20		7	1	1		6	[3] 1	34
Typhoid fever							2		2	
Typhus fever	1								1	

[1] If place of infection is known, cases are so listed instead of by residence.
[2] 7 recurrent cases.
[3] Reported in the Canal Zone only.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended May 10, 1947.—During the week ended May 10, 1947, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox	---	35	---	218	285	13	29	27	79	686
Diphtheria	---	2	2	22	2	3	---	---	---	31
Dysentery:										
Amebic	---	---	---	---	4	---	---	---	---	4
Bacillary	---	---	---	1	---	---	---	---	---	1
German measles	---	---	---	80	61	2	13	5	6	167
Influenza	---	1	---	---	5	---	---	---	75	81
Measles		21	4	42	168	213	38	36	175	697
Meningitis, meningococcus	---	---	---	---	---	---	---	---	1	1
Mumps	---	33	1	31	419	34	79	18	161	776
Poliomyelitis	---	---	---	---	---	---	---	---	1	1
Scarlet fever	1	1	2	50	101	11	2	6	6	180
Tuberculosis (all forms)	---	---	19	106	37	16	4	26	113	321
Typhoid and paratyphoid fever	---	---	---	4	3	---	---	1	1	9
Undulant fever	---	---	---	5	1	2	---	2	4	14
Venereal diseases:										
Gonorrhea	---	10	9	140	74	[1]80	20	42	82	457
Syphilis	---	11	7	60	60	[1]28	14	12	43	235
Other forms	---	---	---	---	---	---	---	---	3	3
Whooping cough	---	---	---	46	90	14	---	14	82	276

[1] Manitoba: Figures for week ended May 3 are included.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Plague

China—Fukien Province—Hweian.—During the months of January and February 1947, 255 cases of plague with 71 deaths were reported in Hweian, Fukien Province, China.

Peru.—For the month of April 1947, plague was reported in Peru as follows: Lambayeque Department—Province of Chiclayo, Monsefu, 2 cases, 2 deaths, Puerto de Eten, 2 cases; Piura Department—Province of Huancabamba, Chalaco, 10 cases, Pacaipampa, 8 cases, 2 deaths, Tuluce, 1 case.

Smallpox

China—Shanghai.—For the week ended May 17, 1947, 150 cases of smallpox were reported in Shanghai, China.

Great Britain—England and Wales.—Smallpox has been reported in England as follows: Week ended May 17, 1947, Barnsley (Yorks), 3 cases; Bermondsey, 1 case; Bilston, 3 cases; Birmingham, 1 case. Week ended May 24, 1947, Barnsley, 2 cases; Bilston, 2 cases; Coseley, 1 case; Sheffield, 1 case.

Indochina (French).—For the period May 1–10, 1947, smallpox was reported in French Indochina as follows: Annam, 14 cases, 6 deaths; Cambodia, 122 cases, 34 deaths.

Venezuela.—For the week ended May 17, 1947, 185 cases of smallpox (alastrim) with 1 death were reported in Venezuela, by States, as follows: Bolivar, 59 cases; Guarico, 32 cases, 1 death: Sucre, 94 cases.

Typhus Fever

Peru.—For the month of March 1947, 131 cases of typhus fever were reported in Peru.

Rumania.—For the week ended April 26, 1947, 1,269 cases of typhus fever were reported in Rumania.

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J. PERROTT, *Chief of Division*

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Public Health Reports

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STUDIES IN DERATIZATION OF SURFACE VESSELS BY MEANS OF 1080 (SODIUM FLUOROACETATE)[1]

By JOHN H. HUGHES, *Senior Assistant Sanitarian (R), United States Public Health Service*

Rat control on surface vessels has long received serious attention, particularly since the incrimination of the rat and flea in plague transmission. It has been given further impetus by the discovery that other rat-borne arthropods are vectors.

Ratproofing provisions have been incorporated into the construction plans of modern vessels with favorable results; but of course there are still many ships that offer rats an abundance of attractive harborage.

The United States Public Health Service has developed and utilized numerous methods of rat control on surface vessels, including fumigation with hydrocyanic acid gas, the use of traps, and the use of stomach poisons. Hydrocyanic acid gas fumigation has given the most satisfactory results.

Some new rodenticides were developed during World War II, and a search for others is being conducted at present. The compound "1080" (sodium fluoroacetate) is the product of an accelerated wartime rodenticide research program sponsored by the National Research Council. This compound has proved to be very effective for general rodent control. "ANTU" (alphanaphthylthiourea), another recently developed compound, reportedly is highly specific to the Norway rat, *Rattus norvegicus*.

In 1945 the Foreign Quarantine Division of the Public Health Service began a study to ascertain the potential effectiveness of new rodenticides in rat control on surface vessels. There follows a report of the developmental nature of the study of the 1080 compound in

[1] From the Foreign Quarantine Division.

deratization and some results obtained, with pertinent information on the compound 1080.

THE QUARANTINE 1080-DERATIZATION PROGRAM

A few quarantine stations were advised of the proposed study. They were subsequently provided with information pertaining to the nature and use of the two rodenticidal compounds, 1080 (sodium fluoroacetate) and ANTU (alphanaphthylthiourea), and were instructed to place initial emphasis on the use of 1080. Because of the known hazards associated with the use of the poisonous compound 1080, it has been necessary to observe precautions in setting up and conducting the study.

Facilities available at quarantine stations lend themselves readily to studies of the nature being reported. Quarantine personnel are well aware of the rat-control problems. Carefully trained inspectors, many of whom have had years of experience in ship inspection and rat-control work, are available. One of the most desirable features is the study unit, the ship. Various activities aboard can be controlled to a large degree during deratization operations. This aids materially in the evaluation of the rat-control method employed. Fluctuation of the rat population during the course of the deratization study on a ship can be largely prevented. It is possible to account for the rats on a particular vessel with a fair degree of accuracy.

PROCEDURE FOR 1080-DERATIZATION STUDIES

Vessels subject to quarantine inspection and treatment for rats are methodically examined by inspection crews for evidence of rats and for the nature and distribution of the infestation. Simultaneously with the inspection for rat evidence, pertinent observations regarding the cargo are made The latter is very important and may preclude, or necessitate modification of, a particular control method.

When it has been decided to employ the 1080 compound on a certain surface vessel, the ship's personnel and others concerned are notified, through a responsible officer of the vessel, and advised of the hazards involved.

The rat-control crew, usually consisting of two or three of the men who inspected the vessel for rat evidence, then proceeds with the control measures.

The 1080 compound is a powder. It may be used in a water solution or with bait.

When used in water, one-half ounce or 14 gm. of the 1080 concentrate are dissolved in each gallon of water required. For the purpose of this program it was suggested that wax-coated squat paper cups of approximately 1-ounce capacity and chicken-watering fountains of

1-pint capacity be used in making the poisoned water available to the rats. The paper cups have been largely satisfactory, although other types of shallow containers are also being used. The fountain-type dispenser has been utilized to a lesser degree. Approximately three-fourths ounce of the 1080 solution is placed in each of the paper cups. This small quantity may be objectionable, particularly when the evaporation rate is high.

Recommendations for baits are one ounce or 28 grams of 1080 concentrate for each 28 pounds of bait.

The poisoned water may be prepared at the quarantine station prior to the time needed, or on board the vessel to be treated. Some stations prepare measured quantities of the concentrate, sufficient for use in 1 or 2 gallons of water, and store it in vials or other suitable containers.

The use of a large number of poison stations in ship work is usually more effective than the use of a large quantity of poison solution or bait at a few points. The dispensers, plainly labeled as to poisonous content, are securely fastened at strategic points along rat runways and near harborages, preferably in protected places. Care is exercised in determining the areas to be treated and the number and types of dispensers to be used. One quarantine station is utilizing boxlike shelters in which to place some of the poison dispensers.

Ten-eighty poisoned water has been used on all vessels treated in this quarantine program. Poisoned bait has been used on a few of the vessels, but only as a supplemental measure. When baits are used, it is very probable that some will be carried into harborages by the rats and eaten there. This would tend to increase the number of rats which die in places from which their recovery is difficult. Obviously, baits are more costly to prepare than the aqueous solution of 1080.

The 1080-treated ships are carefully searched for poisoned rats, usually within 24 hours following distribution of the poison, and daily until termination of study on a particular ship. It has been noted that poisoned rats frequently die within a few feet of the 1080 dispensers and are easily recovered by inspectors. However, in many instances the poisoned rats have sought harborages from which it has been difficult or impossible for inspectors to recover them. Poisoned rats are destroyed or buried following their identification and study. At the conclusion of the program on a vessel, dispensers and materials containing 1080 are removed. These are labeled and stored for future use, or are destroyed.

SOME RESULTS OBTAINED WITH 1080 ON SHIPS

The initial application of 1080 on a surface vessel during the present study was made in April 1946. During an interval of nearly

1 year 96 vessels have been individually treated with 1080 and observed for results.

A questionnaire furnished the quarantine stations at the beginning of the program has made it possible to obtain reasonably complete and uniformly reported data for each vessel. These reports, one for each vessel treated with 1080, are submitted to headquarters.

A summary of some of the data obtained is given in table 1. Although only four stations have submitted reports to date, 21 others have been advised of the nature of the program and its possible implications. Several of these stations have arranged to participate.

TABLE 1.—*Summary, 1080 studies at Boston, New Orleans, New York, and Seattle*

Port	Number of ships	Dispensers		Solution 1080 (ounces)	Number of rats	
		Cups	Fountains		Estimated	Killed
Boston	16	1,297	57	1,119	231	156
New Orleans	41	2,806	0	1,610	510	673
New York	16	1,839	44	2,202	354	157
Seattle	23	1,951	31	2,585	380	276
Total	96	7,893	132	7,516	1,175	1,262
Average per ship		82.2	1.37	78.29	15.36	13.14

Among other things, it may be noted that a relatively small amount of 1080 solution was used for each vessel. When expressed in terms of 1080 concentrate, the average amount per vessel is approximately three-tenths ounce.

The critical phase of the study, obviously, is the rat mortality resulting directly from the 1080-poisoning program. As may be observed in table 1, 1,262 of the 1,475 rats estimated were found dead following 1080 application. As previously mentioned, a number of rats poisoned during the program could not be recovered from their harborages. Records for these and for many poisoned mice were not incorporated in this report. Three species of rats were recovered from the ships treated: the black rat, *Rattus rattus rattus* (Linnaeus); the Alexander, gray, or roof rat, *Rattus rattus alexandrinus* (Geoffroy); and the Norway, brown, or sewer rat, *Rattus norvegicus* (Berkenhout).

Results obtained through the use of 1080 were compared with some results of hydrocyanic acid gas fumigations. Eight quarantine stations submitted information as requested, for 159 ships fumigated with HCN gas. These reports, most of which were made during 1945 and 1946, were taken at random from the files. A comparison of data from four of these stations, which also participated in the 1080 studies, is made in table 2. The percent of estimated rats killed on 96 ships with 1080 was 85.5, compared with 99.2 percent on 83 vessels fumigated at the same stations.

TABLE 2.—*Comparison of some HCN and 1080 data for Boston, New Orleans, New York, and Seattle*

Deratization method	Number of ships	Number of rats				Percent of estimate killed
		Estimated		Killed		
		Total	Average	Total	Average	
HCN fumigation	83	1,210	14 58	1,200	14 46	99 2
1080 poisoning	96	1,475	15 36	1,262	13 14	85 5

The percent of estimated rats killed by HCN fumigation at all eight stations was 114.7, which is an increase over that for the stations shown in table 2. If the number of rats estimated could be considered the total population, then 1080 would appear 85.5 percent efficient, as applied in the present study. When compared with results obtained through the 159 HCN fumigations previously mentioned, 1080 results exhibit an efficiency of 74.5 percent. Although the compound 1080 has thus far given favorable results, it is fully realized that conclusive data pertaining to its efficacy in the quarantine deratization program have not been obtained. However, the program is being continued and should provide additional pertinent information.

SUITABILITY OF 1080 FOR SHIPBOARD USE

One of the more desirable features of 1080 when used in rat control on ships is the facility with which it may be employed in combination with water or with baits. It is an effective rat-killing agent, is seemingly readily accepted, and is quick-acting following its ingestion by rats. There is a good possibility of easily recovering most of the dead rats, since many rats die within a few feet of the poison stations subsequent to acquiring a lethal dose. Ship crews may remain aboard, and in some cases vessels may be worked after the poison is distributed, depending on the nature of the cargo, location of poison stations, and other factors which vary with the vessel. In addition to lending itself to application to enclosed areas, 1080 may be satisfactorily applied to open deck spaces, in lifeboats, and elsewhere. The reduced number of personnel needed to conduct a deratization program and the simplicity of equipment required are points to be considered. Among other favorable features of 1080 (*1*) is the apparent insignificant degree of tolerance developed to this poison by rats which may ingest sublethal quantities.

One of the less desirable qualities is that in many instances on ships thus far treated only a partial kill of rats was obtained during the first day. This apparent deficiency may be largely due to methods employed, rather than to the poison itself. Also, an aqueous

solution of 1080 freezes when exposed to low temperatures, which necessitates modification of the formula if it is to be used under such conditions.

ADDITIONAL INFORMATION ON TOXICITY OF 1080

The chemical compound 1080 is highly poisonous to rats, and effective when used in accordance with recommendations. The Norway rat, *Rattus norvegicus*, requires only 4 mg. of this poison concentrate per kilogram of body weight to kill 50 percent of the rats so treated. Even this seemingly minute quantity is greater than that required for other species of wild rats tested. This may be seen in table 3, which was compiled from data incorporated in a National Research Council report (*2*) giving the approximate amounts required to kill 50 percent (LD_{50}) and 90 percent (LD_{90}), respectively. The Norway rat, although apparently more resistant to 1080, is far more susceptible to ANTU than other species of wild rats tested.

TABLE 3.—*Toxicity of 1080 to rats*

Species of rat	Milligrams of 1080 per kilogram of body weight required to kill—	
	50 percent	90 percent
Rattus norvegicus	4	6
Rattus rattus alexandrinus	1	2
Rattus rattus rattus	1	2
Rattus rattus frugivorus	1	2

Ten-eighty is also very poisonous to other animals and presumably to man. Its toxicity to a number of birds and mammals, including certain species of rats, is shown in table 4, which was taken from a National Research Council report (*1*) and modified with respect to requirements for the LD_{50} percent for wild rats, revised data (*2*) being used.

In addition to the fact that 1080 is extremely toxic when taken directly into the body, there are reported deaths to dogs, cats, and other animals (*2*) due to secondary 1080 poisoning, resulting from consumption of dead or dying rats. Dogs and cats are very susceptible to 1080 poisoning, as may be seen from table 4; the amount of 1080 required per kilogram of body weight to kill 50 percent of the dogs and cats is considerably less than that for rats. It is apparent, therefore, that 1080-poisoned rats offer a definite hazard to these animals.

The calculated comparative toxicities to man of seven rodenticides, including 1080, are shown in table 5, which was taken from a National Research Council report (*2*) and slightly modified.

TABLE 4.—*Toxicity of 1080 to various mammals and birds*

Species of animal	Amount of 1080 in milligrams per kilogram of body weight of animal	Percentage killed
Albino rat	5-7	50
Norway rat, wild (*Rattus norvegicus*)	4	50
Roof rat, wild (*R. rattus subsp.*)	1	50
Cat	0.3	50
Dog	0.1-0.2	50
Goat	0.7	50
Pig	0.3	50
Horse	1	50
Monkey (Rhesus)	5-7.5	50
House mouse	8-10	50
Chicken (Rhode Island Red hens)	6-7	50
Mourning dove (*Zenaidura macroura*)	10	33
English sparrow (*Passer domesticus*)	2.7	100

TABLE 5.—*Comparative toxicities to man of 7 rodenticides*

Poison compound	Poison concentration in bait	Estimated LD_{50} in milligrams of poison per kilogram body weight	LD_{50} for 70 kilogram man (milligrams)	Poison in bait—milligrams/ounce	Lethal dose in terms of bait used in the field (ounces)
Sodium fluoroacetate (1080)	1 : 454	5	350	62.4	5.6
	1 : 268 (water)	5	350	105.1	3.3
Thallium sulfate	1 : 65	20	1,400	436.5	3.2
Zinc phosphide	1 : 50	40	2,800	567.0	4.94
Barium carbonate	1 : 5	800	56,000	5,670	9.9
Arsenic	1 : 33	1.5-15	105-1,050	860	0.12-1.22
Strychnine	1 : 320	1	70	88.5	
Alphanaphthylthiourea (ANTU)	1 : 20	[1]			[2]

[1] Not determined.
[2] Thought to be high.

The high absorption rate of this compound by the gastrointestinal tract makes treatment for 1080 poisoning difficult. It is highly soluble in water and may be washed out of baits or formulations in the presence of rainfall or other water source and might possibly cause contamination of food or other supplies.

Ten-eighty concentrate is a white powder which could be mistaken for flour, baking powder, or similar food products if not properly labeled and kept under safeguards. The powder form of 1080 is said to be slightly hygroscopic (*2*), and in the presence of excessive moisture this could make accurate weighing and measuring or application of the concentrate to bait difficult.

SUGGESTED PROCEDURE FOR USE IN CASE OF 1080 POISONING

There is no specific treatment known for 1080 poisoning. Instructions given by the National Research Council (*1*), most of which are incorporated in the ensuing paragraphs, should be followed in case of 1080 poisoning. *A physician should be called at once.*

This poison compound acts upon the heart and nervous system of birds and mammals. Death usually results from its effect on the heart.

Ten-eighty is absorbed readily by the gastrointestinal tract and must, therefore, be removed immediately if harmful effects are to be prevented. The patient should be made to vomit at once by sticking a finger in the throat or by other means. Give a dose of magnesium sulfate (Epsom salt) or other cathartic as a purge.

In the event of nervous system excitation the careful use of barbiturates of medium duration of action, such as sodium amytal, intravenously if necessary, is suggested. Other than complete rest and adequate sedation, little can be done to prevent progression of cardiac symptoms. Should ventricular fibrillation occur, intracardiac injection of 5 cc. of 1-percent solution of procaine hydrochloride might be attempted to restore an organized heartbeat. Although symptoms of 1080 intoxication will usually subside within 1 day, the patient should be kept quiet for a period of 3 days if there is any sign of action on the heart.

REFERENCES

(*1*) Anonymous: Instructions for using compound 1080 (sodium fluoroacetate) as a rodent poison. National Research Council, Washington, D. C. Revised July, 1946 (mimeographed).

(*2*) Ormsbee, R. A.: A summary of field reports on 1080 (sodium fluoroacetate). National Research Council, Washington, D. C. December 17, 1945 (mimeographed).

YELLOW FEVER VACCINE INACTIVATION STUDIES [1]

By H. W. Burruss, *Associate Technologist*, and M. V. Hargett, *Senior Surgeon, United States Public Health Service*

Yellow fever vaccine is a preparation of living yellow fever virus of an attenuated strain designed to initiate a mild general infection in the nonimmune recipient (*1*, *2*). The immunity resulting from such infection is protective against even the most severe forms of this disease (*3*). To insure the development of immunity subsequent to vaccination requires a vaccine of sufficient living-virus content (*4*, *5*). The failure of immunity to develop subsequent to vaccination with preparations of inadequate virus content has been recorded by Soper and Smith (*6*). Elliott (*7*) has reported the development of severe yellow fever (with two deaths) in three soldiers vaccinated 4 to 16 months previously. On the other hand, Fox, Kossobudzki, and da Cunha (*8*) and Hargett (*9*) report 100-percent immunity following vaccination, and Bugher and Gast-Galvis (*3*) record complete protection of over 600,000 persons vaccinated in Colombia.

[1] From the Rocky Mountain Laboratory of the Division of Infectious Diseases, National Institute of Health.

As yellow fever virus is one of the most labile of viruses (*4*) it is important to know what degree of virus inactivation occurs when the vaccine is maintained in storage for prolonged periods and when it is exposed to various deleterious environments such as are often encountered under field conditions. Such data are of particular value since quantitative determinations of virus content can hardly be done outside of the laboratory, and vaccination with an impotent preparation is quite certain to engender a false sense of security in the vaccinated person. In this paper is presented a series of studies undertaken to gain information relative to vaccine stability under varying conditions.

VACCINE

Forty-nine different lots of vaccine were included in these studies. All were of the 17D serum-free (aqueous-base) type, prepared as described by Hargett, Burruss, and Donovan (*10*) except for some variation in desiccation technique. All were tested as to suitability for human use (*5, 10*) and all were approved except two (lots AB–133 and AB–320 in study No. 2) which caused paralysis in the test monkeys (*11*). Storage was routinely at −9° C. to −32° C. with the extremes only rarely approached.

The 17D strain of yellow fever seed virus employed in preparing these lots was Colombia No. 88, passed two, three, four, or five times through chick embryos. As Colombia No. 88 virus had been passed through 225 tissue cultures and 3 chick embryos, the seed virus employed in preparing the vaccine lots here considered had passed through a total of 225 tissue cultures and 5, 6, 7, or 8 chick embryos. The origin and development of Colombia No. 88 virus is given by Bauer et al. (*4*).

Selection of vaccine lots for investigation depended on availability, volume content of ampules, consecutive order of preparation, and certification as suitable for human vaccination.

TITRATION

The 50-percent end point method of Reed and Muench (*12*) was employed in all determinations of virus content. This titer, as employed in these studies, indicates the dilution of vaccine in which one volume of 0.03 ml. of diluted material contains one MLD of virus. The number of MLD in 1.00 ml. of undiluted vaccine is thus the titer multiplied by 33⅓.

Rehydration of desiccated vaccine was accomplished with distilled water or 0.85-percent sodium chloride solution. Dilutions were made with similar saline to which had been added nonimmune human serum in the proportion of one part serum to nine parts salt solution.

All mice were of the white Swiss strain raised in this laboratory from a single inbred colony. Daily inspection of all animals was made for a period of 3 weeks subsequent to inoculation.

STUDY NO 1—THE IMPORTANCE OF TEMPERATURE IN VACCINE DESICCATION

Object.—To determine whether vaccine desiccated at 38° C. to 40° C. is more or less stable than vaccine desiccated at 23° C. to 25° C.

Vaccines.—Eight different lots were studied. Ampules contained 1.00 ml. of vaccine each. All lots were prepared in like manner except for desiccation. The seed virus employed had passed through a total of 225 tissue cultures and 8 chick embryos.

Desiccation.—The desiccator employed was of the lyophile type similar in construction principles to that described by Bauer and Pickels (*13*). It was set up to permit room air to circulate freely about each ampule throughout the desiccation period. Four lots of vaccine were attached at different times to the desiccator in a refrigerated room with a temperature of −19° C to −22.5° C. The vaccine remained in this room throughout the desiccation period of about 20 hours (20 hours to 20 hours and 50 minutes) with the room temperature elevated from the low mentioned to a terminal high of 38° C. to 40° C. Desiccator vacuum at termination of drying registered 1.10 to 1.25 microns. As soon as desiccation was terminated, the ampules were filled with dry nitrogen, sealed, inspected, and stored in the usual manner (*10*). Four other lots were attached at different times to the same desiccator in a room where the temperature was 23° C. to 25° C. This room remained at this temperature throughout the entire desiccation period of about 3 hours (2 hours and 45 minutes to 3 hours and 30 minutes). Vacuum at termination of desiccation registered 0.75 to 0.80 micron. The ampules were cared for as with the preceding lots.

Stability.—To determine stability of the desiccated vaccines, contents of representative ampules from each of the eight lots were titrated for virus content before and after exposure in the dark at 37° C. for 2 and for 28 weeks. It was assumed that the loss of titer which occurred during exposure would indicate the comparative stability of the preparations under study.

Titrations.—Contents of 4 ampules pooled; fourfold dilutions; 7 different dilutions; 18 mice per dilution; mice 37 to 39 days old.

Results and comment.—Results are given in table 1. The percentage inactivation of virus in the two groups of vaccines is almost identical and indicates equal stability of vaccines desiccated at 23° C. to 25° C. compared with those desiccated at −22.5° C. to 40° C. The latter vaccines presented a finer desiccation pattern, a lighter color, a

better appearance, and suspended a little more readily in physiological saline. The factors of convenience and cost of preparation favor desiccation at "room temperature." In the writers' experience, 2 hours is ample to thoroughly dry ampules containing 1.00 ml. of vaccine, and 6 hours is sufficient for ampules containing 5.00 ml. when the air around the ampules is 20° C. to 25° C.

TABLE 1.—*Inactivation of differently desiccated yellow fever vaccines held at 37° C. for 2 and 28 weeks*

Vaccines		Virus content of vaccines				
		No exposure	2 weeks exposure at 37° C.		28 weeks exposure at 37° C.	
Lot numbers	Terminal desiccation temperatures	Titer	Titer	Percentage loss	Titer	Percentage loss
AB-352	38° C. to 40° C.	60,621	9,503	84.3	60	99.9
AB-353	38° C. to 40° C.	126,484	6,881	94.6	23	99.9
AB-354	38° C. to 40° C.	90,410	13,517	85.1	64	99.9
AB-355	38° C. to 40° C.	114,688	9,134	92.0	36	99.9
Composite results		95,027	9,339	90.2	41	99.9
AB-405	24° C. to 25° C.	146,145	30,638	79.0	141	99.9
AB-408	24° C. to 25° C.	194,612	15,606	92.0	56	99.9
AB-415	21° C. to 25° C.	194,642	8,233	95.8	175	99.9
AB-420	21° C. to 25° C.	304,087	44,892	85.2	12	99.9
Composite results		199,885	20,808	89.6	58	99.9

Despite the drop in titer by 90 percent during the 2-week exposure at 37° C., all eight lots remained potent for release in accordance with the standards established by the Biologics Control Laboratory (*5*) requiring a minimum of 150,000 MLD per milliliter.

Investigations (*14*) of the amount of virus inactivated during desiccation by the two methods described showed an average loss of 34 percent at "room temperature" and 40 percent at −22.5° C. to +40° C.

STUDY NO. 2.—VIRUS TITER OF VACCINES AFTER 1, 2, AND 3 YEARS IN COLD STORAGE

Object.—To gain information as to the rate of virus inactivation occurring in vaccines stored in a commercial cold storage plant.

Vaccines.—Twenty different vaccines were studied. Distribution was 0.50, 1.00, 2.50, or 5.00 ml. per ampule. All were prepared in like manner except that the seed virus employed in preparing the "1942 lots" had passed through 225 tissue cultures and 7 chick embryos, whereas that employed in preparing the "1943 lots" had passed through 225 tissue cultures and 8 chick embryos. Vacuum at termination of desiccation registered 0.50 to 1.00 micron.

Titrations.—Contents of 1 or 2 ampules; fourfold or tenfold dilutions; 5 or 7 different dilutions, and 12 or 24 mice per dilution. Mice were 28 to 45 days old.

Storage.—The vaccines were stored in a commercial cold storage plant. The storage temperature varied from −9° C. to −32° C. with the extremes only rarely approached.

Procedure.—Each lot of vaccine was titrated just prior to being placed in storage and after 1, 2, or 3 years in storage.

Results and comment.—Results are given in table 2. The irregularities are probably properly explained on the basis of inadequate titrations, although the possibility of titer elevations resulting from the action of environmental influences, as occurred in studies No. 5 and 7, must be kept in mind.

TABLE 2.—*Virus titer of yellow fever vaccines at time of preparation and following 1, 2, and 3 years storage at −9° C. to −32° C.*

Vaccines		Titers			
		Original	1 year	2 years	3 years
10 lots prepared in 1942	Minimum	16,100	----------	7,550	11,018
	Median	64,650	----------	25,900	17,010
	Maximum	271,000	----------	69,000	65,536
10 lots prepared in 1943	Minimum	28,000	38,600	42,400	30,000
	Median	134,500	169,500	96,000	117,000
	Maximum	369,000	360,000	217,000+	181,000

The results on the whole show a definite diminution in titer. This does not correlate with the experience reported in study No. 3 in which the vaccines stored under the same conditions for 2 years showed a composite increase in titer. It is to be particularly noted that at no time did the titer of any of the 20 vaccines fall below the minimum of 4,500 (equivalent to 150,000 MLD per milliter set by the Biologics Control Laboratory (*5*)). This study demonstrates that a properly prepared vaccine with a titer as low as 16,100 will retain potency for at least 3 years when stored at −9° C. to −32° C.

STUDY NO. 3.—VIRUS TITER OF VACCINES AFTER 1 AND 2 YEARS STORAGE AT DIFFERENT TEMPERATURES

Object.—To determine the best temperature for the storage of vaccine.

Vaccines.—Four different lots were studied. Ampules contained 0.50 or 1.00 ml. of vaccine each. All lots were prepared in like manner except that the seed virus employed in making lots AB–200 and AB–201 had passed through 225 tissue cultures and 7 chick embryos, whereas that used in preparing lots AB–202 and AB–203 had passed through 225 tissue cultures and 5 chick embryos. Vacuum at termination of desiccation registered 2.50 to 3.00 microns.

Titrations.—Contents of one ampule; tenfold dilutions; 6 different dilutions; 12 mice per dilution; mice 34 to 45 days old. The composite

titer was determined for each set of conditions of the three titration periods.

Procedure.—Titer of each vaccine was determined just prior to test exposure and again following storage for 378–379 days and 730 days at the following four temperatures:

+3° C. to +5° C.
−5° C. to −7° C.
−13° C. to −32° C.
−78° C.

Results and comment.—The composite titers recorded in table 3 indicate that considerable virus inactivation occurred during storage at the two higher temperatures and none at the two lower temperatures. In fact, the vaccines appear to have improved in potency during storage at the two lower temperatures. The cause of this increase is a matter for conjecture. Some suggestion is given by study No. 2 that inadequate titrations may be the cause. On the other hand, studies No. 5 and No. 7 demonstrate some very definite titer increases following subjection of vaccines to various environments which cannot be explained by inadequate or faulty titration.

TABLE 3.—*Composite titers of four lots of desiccated yellow fever vaccine before and subsequent to prolonged storage at different temperatures*

Exposure period	Exposure temperature			
	3° C. to 5° C.	−5° C. to −7° C.	−13° C. to −32° C.	−78° C.
0 days (no exposure)	22,800	22,800	22,800	22,800
378–379 days	3,770	12,800	23,300	22,800
730 days	2,740	4,640	30,700	27,400

Examination of individual titration results reveals that at the end of 378–379 days' storage all vaccines except three stored at 3° C. to 5° C. were fully potent according to the standards of the Biologics Control Laboratory (*5*) which stipulate a minimum titer of 4,500. After a 2-year storage all vaccines except those stored at 3° C. to 5° C. and one stored at −5° C. to −7° C. were also found to be potent.

The desirability of storing vaccines at a temperature sufficiently low to insure a high degree of virus preservation is apparent. On the basis of this study, and considerable additional experience, it is our opinion that a temperature of −20° C. to −25° C. is an excellent storage temperature. Electric ice cream storage cabinets and commercial cold storage plants commonly afford such storage. Although lower temperatures may prove to be a little more efficient, the higher refrigeration cost is believed to be unwarranted.

STUDY NO. 4.—INACTIVATING EFFECT OF FLUORESCENT LIGHT ON DESICCATED VACCINES

Object.—To secure information relative to the inactivating effect of light on vaccine.

Vaccines.—Four different vaccines were studied. Distribution was 1.00 ml. per ampule. Ampules were of pyrex glass. All lots were prepared in a similar manner. The seed virus employed had been passed through 225 tissue cultures and 8 chick embryos. Vacuum at termination of desiccation registered 0.50 to 0.75 micron.

Titrations.—Contents of 4 ampules pooled; fourfold dilutions; 7 different dilutions; 24 mice per dilution; mice 40 to 44 days old.

Light.—Two 100 watt "3,500° white" fluorescent lamps of a type in common use constituted the source of light. Spectral distribution of the rays has been determined (*15, 16*) to be almost wholly in the 3,800–7,200 Angstrom band and principally in the 3,950–4,470 and 5,090–6,950 segments. The two lamps were mounted parallel in a horizontal plane in a commercial-type metal fixture having a white enamel reflector. The lamps were suspended 769 mm. directly above a laboratory bench located in a dark corner. Light intensity at point of vaccine exposure was 100 foot-candles as determined with a sight meter.

Procedure.—Ampules of vaccine were taken from cold storage, their labels removed, and promptly exposed. Light exposure was realized by laying the ampules on a white cloth placed on the laboratory bench directly below the described lamps. Dark exposure was made by placing the ampules in a tight black box on the same bench but not under the lamps. Exposure temperatures were determined by placing a thermometer nearby. The ampules remained immobile throughout the exposure period.

The titer of each vaccine was determined promptly following removal from storage and following termination of exposure. Every exposure was for 6 hours at "room temperature" with 0, 3, or 6 hours' exposure to light during this period.

Results and comment.—Results are given in table 4. Exposure in the dark for 6 hours at 22.2° C. to 26.8° C. caused two lots to lose appreciable titer (20 and 27 percent), one to remain essentially unaltered, and one to show a definite increase (51 percent). Exposure to light for 3 or 6 hours resulted in a significant diminution in titer.

It should be kept in mind that these results are applicable only to light of a particular intensity and spectral composition. This light possesses moderate inactivating properties. The results suggest that the vaccine should not be unnecessarily exposed to light.

TABLE 4.—*Titer of four lots of yellow fever vaccine before and after exposure to room temperature and fluorescent light*

Vaccine lot number	Exposure temperature (in degrees centigrade)	Titers			
		Dark 0 hours Light 0 hours	Dark 6 hours Light 0 hours	Dark 3 hours Light 3 hours	Dark 0 hours Light 6 hours
AB-459	22.2° to 20.8°	216, 269	158, 597	114. 688	70, 779
AB-460	22.8° to 26.5°	201, 851	160, 563	186, 778	192, 020
AB-469	23.0° to 24.0°	160, 563	242, 483	119, 276	162, 529
AB-470	22.7° to 21.7°	184, 812	181, 535	176, 292	137, 626
Average		190, 874	185, 795	149, 259	140, 739
Percentage loss			2. 7	21. 8	26. 3

STUDY NO. 5.—EXPOSURE OF DESICCATED VACCINES FOR 7 OR 8 HOURS TO DIFFERENT TEMPERATURES

Object.—To determine what effect temperatures ranging from 25° C. to 110° C. may exert on desiccated vaccine.

Vaccines.—Eight different lots were studied. Ampules of lots AB-250 and AB-253 contained 0.50 ml. of vaccine each, of lots AB-251 and AB-252 1.00 ml. each, and of lots AB-317, AB-322, AB-326, and AB-331 2.50 ml. each. All were prepared in like manner except for desiccation and the seed virus employed. The virus used in preparing lots AB-251 and AB-252 had passed through 225 tissue cultures and 5 chick embryos, whereas that used in preparing the other lots had passed through 225 tissue cultures and 8 chick embryos. Vacuum at termination of desiccation of lots AB-250-251-252-253 was 1.50 to 1.80 microns and that of lots AB-317-322-326-331 was 0.75 micron. Final desiccation temperature of the "200-series" vaccines was 24.0° C. to 24.8° C., and of the "300-series" vaccines 37.0° C. to 37.75° C.

Titrations.—Contents of 2 ampules pooled; tenfold dilutions; 4 to 6 different dilutions; 12 mice per dilution for the 8-hour exposures and 18 mice per dilution for the 7-hour exposures; mice 36 to 39 days old.

Procedure.—Representative ampules of each lot of vaccine were titrated promptly upon removal from cold storage and after an exposure period of 7 or 8 hours to heat. Promptly following termination of exposure, the test ampules were removed from the test environment and packed in dry ice. Titration was then undertaken at once or within 2 hours.

Results and comment.—Results are shown in chart 1 and table 5. It was surprising to find that every one of the eight vaccines showed an elevation in titer following 7 or 8 hours' exposure at 25° C. to 37° C. The cause for this increase is a matter for conjecture; it certainly is not to be explained on the basis of defective titrations. The same phenomenon was observed with all four vaccines diluted 1:1 in study No. 7.

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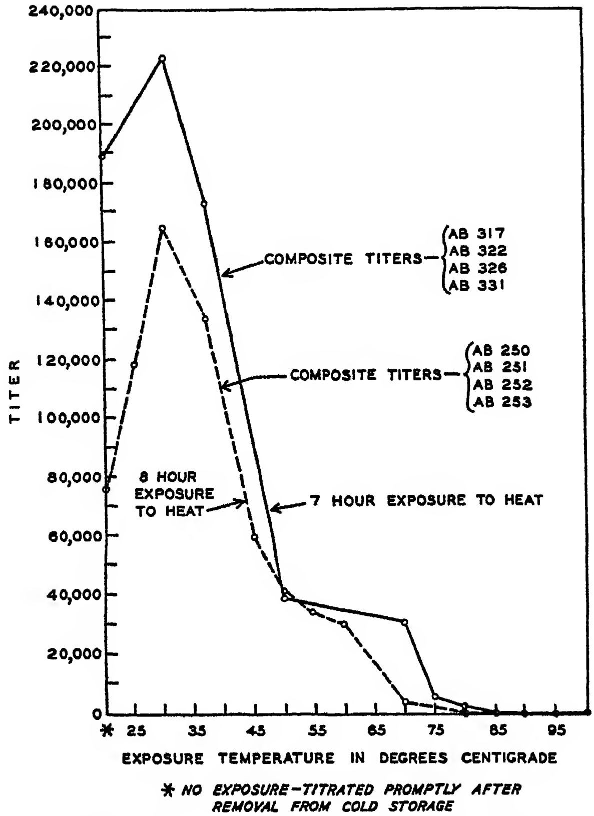

CHART 1.—Composite titers of desiccated vaccines exposed 7 or 8 hours at different temperatures.

TABLE 5.—*Virus titers of desiccated yellow fever vaccines following 7 or 8 hours' exposure to different temperatures*

Exposure temperature in degrees centigrade	Titration results									
	8-hour exposure to heat					7-hour exposure to heat				
	Vaccine lot numbers				Composite averages	Vaccine lot numbers				Composite averages
	AB-250	AB-251	AB-252	AB-253		AB-317	AB-322	AB-326	AB-331	
No exposure	44, 300	161, 000	35, 200	212, 000	75, 500	203, 000	239, 000	181, 000	150, 000	190, 000
24.5° to 25.5°	62, 700	198, 000	36, 000	314, 000	117, 000	--------	--------	--------	--------	--------
29.5° to 30.5°	154, 000	100, 000	117, 000	280, 000	165, 000	233, 000	274, 000	233, 000	150, 000	223, 000
36.5° to 37.5°	203, 000	100, 000	69, 000	173, 000	134, 000	70, 500	287, 000	161, 000	217, 000	173, 000
44.5° to 45.5°	40, 400	64, 400	65, 900	72, 000	60, 000	--------	--------	--------	--------	--------
49.5° to 50.5°	74, 000	60, 000	39, 400	19, 000	41, 300	35, 200	36, 000	54, 800	32, 900	38, 600
53.3° to 57.3°	39, 400	65, 900	41, 300	17, 300	34, 400	--------	--------	--------	--------	--------
59.5° to 60.5°	31, 400	29, 300	16, 500	72, 000	30, 700	--------	--------	--------	--------	--------
69.5° to 71.0°	2, 740	6, 000	6, 590	3, 940	4, 430	26, 100	77, 500	23, 300	25, 500	31, 400
74.0° to 76.0°	--------	--------	--------	--------	--------	2, 610	4, 970	7, 050	12, 500	5, 480
79.0° to 81.0°	644	600	2, 680	464	775	1, 610	1, 810	4, 240	3, 210	2, 610
84.0° to 86.0°	--------	--------	--------	--------	--------	64	173	344	404	223
88.9° to 91.5°	1	3	2	3	>1	<1	1	2	>1	<1
99.0° to 102.0°	0	0	0	0	0	<1	0	<1	<1	<1
109.0° to 111.0°	--------	--------	--------	--------	--------	0	0	0	0	0

It is to be noted (*a*) that exposure for 7 or 8 hours at 30° C. resulted in a significant elevation of the composite titers, (*b*) that exposure for 7 or 8 hours at 37° C. resulted in either a gain or a slight drop in the composite titers, (*c*) that exposure for 7 hours at 80° C. or 8 hours at 70° C. was required to lower the composite titers below the minimum of 4,500 set by the Biologics Control Laboratory (*5*), (*d*) that every lot exposed 7 or 8 hours at 80° C. still contained adequate virus for immunization (*4*, *5*), (*e*) that exposure for 7 hours at 110° C. or 8 hours at 100° C. was necessary to inactivate all virus, and (*f*) that all lots of vaccine reacted in a similar manner.

This study indicates that properly desiccated vaccine of good titer can withstand considerable exposure to heat such as might be encountered in tropical countries and yet possess sufficient active virus for immunization.

STUDY NO. 6.—EXPOSURE OF DESICCATED VACCINES FOR 2 YEARS AT 37° C.

Object.—To determine the rate of virus inactivation of desiccated vaccines held at a tropical temperature.

Vaccines.—Four lots of vaccine prepared in like manner were studied. Each ampule contained 1.00 ml. of vaccine. The seed virus employed had passed through 225 tissue cultures and 8 chick embryos. Vacuum at termination of desiccation registered 1.10 to 1.25 microns.

Titrations.—Contents of 4 ampules pooled; fourfold dilutions; 7 different dilutions; 18 mice per dilution; mice 37 to 39 days old. The composite titers for each titration period were determined.

Procedure.—Ampules of each lot were placed in a bacteriological incubator set at 37° C. The contents of representative ampules were titrated at initiation of exposure and thereafter at varying intervals.

Results and comment.—Selected results of special interest showing the alterations in titer are shown in table 6. It is to be observed (*a*) that all four lots of vaccine reacted in a similar manner, (*b*) that exposure for 2 weeks at 37° C. resulted in a titer decline of 90 percent, (*c*) that every lot still contained adequate virus for successful vaccina-

TABLE 6.—*Virus titer of yellow fever vaccines exposed at 37° C.*

Exposure in weeks at 37° C	Titers					Percentage titer loss
	Lot AB-352	Lot AB-353	Lot AB-354	Lot AB-355	Composite titer	
0	60,621	126,484	90,440	114,688	95,027	....
2	9,503	6,881	13,517	9,134	9,339	90.17
4	1,382	2,888	4,751	2,212	2,437	97.43
6	1,300	1,761	3,123	883	1,587	98.33
8	420	351	1,475	609	584	99.38
28	60	23	64	36	41	99.96
52	18	8	23	33	18	99.98
78	2	4	3	6	3	99.99
104	Trace	6	Trace	<2	<1	99.99

tion after 8 weeks' exposure (*4*, *5*), (*d*) that active virus was still present after 78 weeks' exposure, and (*e*) that virus was detectable in all lots after 104 weeks' exposure.

On the basis of results reported by Fox, Kossobudzki, and da Cunha (*8*), some persons vaccinated in the usual manner (vaccine diluted 1:10, and 0.50 ml. inoculated subcutaneously) with these vaccines which had been exposed for 2 years would develop immunity. The likelihood of immunity resulting from vaccination with such vaccine would increase as the amount of vaccine administered was increased. When occasion arises necessitating the use of vaccine of questionable potency, it is recommended that 10 to 20 times the usual quantity of vaccine be given.

STUDY NO. 7.—ALTERATIONS IN TITER OF DILUTED VACCINE HELD AT 37° C.

Object.—To find what changes in virus titer occur when vaccine is diluted with physiological saline and held for varying periods at a tropical temperature.

Vaccines.—Four lots were studied. Ampules contained 2.50 or 5.00 ml. each. All lots were prepared in like manner except for the seed virus; lots AB–494, AB–577, and AB–590 were made with a seed-virus preparation (lot 186) which had been passed through 225 tissue cultures and 8 chick embryos, and lot AB–592 with a seed virus (lot 309) which had been passed through 225 tissue cultures and 6 chick embryos. The two seed viruses were derived from a common progenitor (Columbia No. 88 virus) with the latter five passages of the first (lot 186) and the latter three passages of the second (lot 309) following different chick-embryo passage lines. Vacuum at termination of desiccation registered 0.50 to 1.25 microns.

Titrations.—Contents of one ampule or contents of two ampules pooled; fourfold dilutions; 2 to 11 different dilutions; 24 mice per dilution; mice 36 to 45 days old.

The average titer for each situation was determined from the results of the four individual lot titrations as shown in table 7. The 65 average titers listed in table 8 were derived in like manner from the 260 individual titrations composing the main study.

Procedure.—The four vaccines were studied in the same manner. The contents of one or two representative ampules were suspended in physiological sodium chloride solution at 37° C. and at once titrated for virus content. This same or similarly diluted vaccine was then held for variable periods at 37° C., as shown in tables 7 and 8, and was again titrated. Studies were made with the vaccines diluted 1:1, 1:10, 1:20, 1:50, and 1:100.

Supplementary study.—Near the termination of the investigations described, it was thought desirable to make a supplementary study to determine what titer change occurs when vaccine is diluted 1:100 and held for only 10 minutes at 37° C. The contents of four ampules of a single vaccine were suspended in saline solution at 37° C., pooled, diluted 1:100 with saline, and at once titrated as described. A second titration was then performed in an identical manner except that the diluted material was held for 10 minutes at 37° C. Each of the four vaccines was examined in like manner.

Results and comment.—Complete results for the 1:1 dilution study are given in table 7. The average titers of all five dilution studies are presented in table 8. The composite value of the primary titrations of the supplementary study was 83,456 and of the secondary, 87,040—not a significant difference.

TABLE 7.—*Virus content of four lots of yellow fever vaccine rehydrated to predesiccation volume with physiological saline, and held for variable periods at 37° C.*

Exposure in hours	Titers				
	Lot AB-494	Lot AB-577	Lot AB-590	Lot AB-592	Average
0	429,916	296,223	226,099	43,090	248,832
1	534,774	833,618	398,450	133,693	475,136
2	519,045	440,402	450,888	139,592	387,482
4	179,569	353,804	192,020	115,999	210,371
6	176,292	249,037	141,558	1,659	142,137
8	146,145	120,761	80,609	3,256	89,943
10	50,463	50,463	58,819	136	39,970
12	43,000	13,722	81,265	4	34,520
16	9,503	620	20,152	<1	7,569
20	371	20	335	<1	182
24	2	5	8	0	4
36	<1	0	0	<1	<1
48	0	0	0	0	0

TABLE 8.—*Average titers of four lots of yellow fever vaccine diluted with physiological saline and titrated before and after variable intervals at 37° C.*

Exposure in hours	Titer averages				
	Dilution 1:1	Dilution 1:10	Dilution 1:20	Dilution 1:50	Dilution 1:100
0	248,832	113,971	128,615	185,742	153,920
1	475,136	106,201	72,653	98,944	68,656
2	387,482	55,859	85,453	77,856	02,864
4	210,371	36,326	36,301	47,392	19,432
6	142,137	24,954	25,191	25,616	3,652
8	89,943	13,417	13,776	15,734	1,485
10	39,970	8,060	4,768	5,892	3,048
12	34,520	3,942	2,533	4,943	1,324
16	7,509	275	1,766	645	1,496
20	182	55	361	392	316
24	[3] Present	[4] Present	[4] Present	[4] Present	[4] Present
36	[2] Present	Absent	[2] Present	[3] Present	[3] Present
48	Absent	Absent	[1] Present	[1] Present	[2] Present

[1] 1 lot showed presence of virus.
[2] 2 lots showed presence of virus.
[3] 3 lots showed presence of virus.
[4] 4 lots showed presence of virus.

It is to be noted that every one of the four vaccines diluted 1:1 showed a significant elevation in titer after being held 1 and 2 hours at 37° C. as compared with the initial values. No comparable elevation occurred in the higher dilutions as may be seen from table 8. Why vaccine diluted 1:1 and held at 37° C. should increase in titer is unknown. The same type of behavior was encountered in study No. 5.

Further examination of table 7 reveals that vaccine AB–592 lost titer more rapidly than did the other lots. This markedly different behavior was also seen in the 1:10, 1:20, and 1:50 dilution studies, and to a lesser degree in the 1:100 dilution study. As lot AB–592 differed from the other vaccines only in that a different seed virus was employed in its preparation, it is believed that a substrain difference accounts for this disparity in behavior, despite the fact that the two seed viruses differ only slightly in their passage history. Another difference between these two seed viruses well established by many observations in this laboratory, is that lot 186 produced vaccines of much higher average titer than lot 309 despite all efforts to secure high-titer preparations with the latter. Previous reports (*8, 17, 18, 19, 20*) on 17D virus substrain differences support this explanation, and conversely, these observations extend the previously noted variations. Because of the superiority of the vaccines prepared with the substrain represented by seed virus 186, all vaccine now prepared in this laboratory is made from chick embryos infected with this substrain. The seed-lot system (*8*) is employed to control possible variations.

The Biologics Control Laboratory (*5*) recommends that each person vaccinated receive a minimum of 500 MLD of virus. As it is standard current practice to dilute yellow fever vaccine 1:10 and inject 0.50 milliliter per recipient, this means that the undiluted vaccine must contain a minimum of 10,000 MLD per milliliter (equivalent to a titer of 300) at time of dilution in order to comply with the recommendation. The titer of none of these diluted vaccines dropped to this minimum within 6 hours regardless of dilution employed. Six showed a titer greater than 300 after 20 hours. Table 8 shows the drop in titer on an averaged basis. It is to be noted that a figure of less than 300 was not reached until 16 hours. All 24-hour determinations, save one, showed the presence of active virus; 10 of the 20 titrations made at 36 hours indicated live virus present; and 4 of the 20 examinations performed at 48 hours showed some virus to be still active.

It is evident from the data presented that any one of these four vaccines may be satisfactorily used in a 1:100 dilution. In the employment of such a dilution the procedure followed by Fox, Kossobudzki, and da Cunha (*8*) is recommended: A primary dilution

of 1:10 is prepared followed by a secondary dilution of 1:100. This latter is made within a 10-ml. inoculating syringe by first drawing in 1.00 ml. of the primary dilution followed by 9.00 ml. of saline. After thorough mixing within the syringe the vaccine is promptly inoculated in a volume of 0.50 ml. per recipient. Not more than 10 minutes need be taken in preparing the secondary dilution and inoculating 20 persons. No significant inactivation of virus occurs during this allotted 10-minute period. As only 500 MLD (*4*, *5*) of virus per recipient are required for satisfactory vaccination (Bugher and Smith (*21*) set the figure at 100 MLD), material diluted and administered as outlined need have a titer of only 3,000 at time employed. Fox and colleagues (*8*) report the development of immunity in every one of a group of 288 persons vaccinated as described. Vaccination by the method set forth is a practical and dependable procedure provided properly prepared vaccine of ordinarily good quality is available.

DISCUSSION

Seven different studies relating to vaccine inactivation have been presented. From 4 to 20 different lots of vaccine were examined in like manner in each study. The examination consisted of titrating a sample from each vaccine to determine its virus titer, exposing a like sample to a definite environment for a certain period of time, and then titrating a sample of the exposed vaccine for virus content to determine what titer alteration may have occurred during the exposure period. The results afford new information of practical value in orienting certain laboratory and field procedures. These results, however, must be applied with caution to vaccines prepared in other laboratories, as employment of different techniques and seed-virus strains may result in vaccines which possess somewhat different characteristics from those reported in these studies.

We employ the term "hump phenomenon" to describe that unexpected and significant elevation in titer encountered with all 12 vaccines included in studies No. 5 and No. 7. That a real elevation of titer did take place following exposure of these vaccines to moderate heat is certain, but this is not to declare that an increase in actual virus content occurred. The explanation of this novel increase requires further investigation. This phenomenon and the variable nature of different 17D substrains are two factors which must be added to the already lengthy list of variables that must be considered in the titration of yellow fever virus.

Certain facts revealed by these studies are of particular value in the laboratory and field disposition of vaccine. Dried vaccine stored at about —22° C. or colder remains adequately stable for years,

whereas if stored at about −6° C. or warmer, inactivation is considerably more rapid. Some desiccated vaccines can be exposed for weeks at tropical temperatures and remain sufficiently potent for dependable use. Vaccine suspended in saline for as long as 20 hours at 37° C. may still contain ample virus for vaccination. Although vaccine may contain adequate virus for immunization after considerable exposure to a more or less deleterious environment, it must be kept in mind (*a*) that some lots possess a much lower initial content of virus than others, (*b*) that lots prepared with different 17D substrains may vary in resistance to inactivating influences, (*c*) that there is no rapid method of determining virus concentration, and (*d*) that employment of an impotent preparation may result in contraction of yellow fever by a person who believes himself protected.

SUMMARY AND CONCLUSION

Forty-nine different yellow fever vaccines were subjected to a variety of environments to determine what effect these environments might exert on the potency of the vaccines. The experiments are presented in seven studies.

Vaccine desiccated at "room temperature" is as stable as vaccine desiccated at 38° C. to 40° C.

Each of 20 desiccated vaccines held in cold storage (−9° C. to −32° C.) for 3 years was found to be adequately potent for use at the termination of the storage period. Vaccine stored at −5° C. to −7° C. and warmer showed considerable loss of active virus during a storage period of 2 years. It is recommended that desiccated vaccine be stored at −20° C. to −25° C. Electric ice-cream storage cabinets and commercial cold storage warehouses commonly afford such storage.

Desiccated vaccine may still be adequately potent for use after an exposure of several weeks to a tropical temperature. Exposed at 37° C., an average of 90 percent of virus was lost in 2 weeks and 99 percent in 8 weeks; active virus was present after 104 weeks. Each of eight different vaccines showed a significant increase in titer when exposed 7 or 8 hours at 25° C. to 37° C. Each of these same eight lots still contained adequate virus for immunization after 7 or 8 hours' exposure at 80° C.; an exposure of 7 or 8 hours at 110° C. and 100° C., respectively, was required to inactivate all virus.

Each of four vaccines diluted 1:1 with physiologic saline at 37° C. and held for 2 hours at that temperature showed a significant elevation in titer. Vaccine diluted 1:1 to 1:100 with saline remained adequately potent for from 6 to 20 hours when held at 37° C. Some dilutions showed active virus still present after 48 hours.

The inherent character of the 17D virus employed in vaccine manufacture is an important factor in determining the stability of the product. Only substrains of known good characteristics should be used for seed virus, and stabilization of the virus should be insured by employment of the seed-lot system.

One milliliter of vaccine of ordinary good quality is ample to successfully vaccinate 200 persons when the vaccine is diluted 1:100 and administered in a volume of 0.50 ml. per recipient.

Relative to vaccine administration it is recommended (*a*) that only preparations be employed which comply with the minimum requirements set up by the Biologics Control Laboratory, (*b*) that vaccine be stored at −20° C. or colder until time of use, (*c*) that neither desiccated nor diluted preparations be unnecessarily exposed to heat or light, (*d*) that 1:1 and 1:10 suspensions be used within 1 hour of preparation and 1:100 suspensions within 10 minutes, and (*e*) that if vaccine of questionable potency must be used, 10 to 20 times the usual quantity be administered.

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(*21*) Bugher, J. C., and Smith, H. H.: Antigenicity of yellow fever vaccine virus (17D) following fifty-seven subcultures in homologous immune serum. Am. J. Hyg., **39**: 52–57 (1944).

DEATHS DURING WEEK ENDED MAY 31, 1947

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended May 31, 1947	Corresponding week 1946
Data for 91 large cities of the United States:		
Total deaths	8, 001	8, 124
Median for 3 prior years	8, 271	
Total deaths, first 22 weeks of year	211, 458	209, 295
Deaths under 1 year of age	672	594
Median for 3 prior years	577	
Deaths under 1 year of age, first 22 weeks of year	16, 837	13, 153
Data from industrial insurance companies:		
Policies in force	67, 303, 577	67, 201, 982
Number of death claims	9, 374	8, 971
Death claims per 1,000 policies in force, annual rate	7.3	7.0
Death claims per 1,000 policies, first 22 weeks of year, annual rate	9.9	10.5

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JUNE 7, 1947

Summary

A total of 48 cases of poliomyelitis was reported for the week, as compared with 42 last week, (160 for the corresponding week last year), and a 5-year (1942–46) median of 60 cases. Only 4 States reported more than 2 cases—California 13 (last week 18), Texas 6 (last week 5), New York 4 (last week 1), and Nebraska 3 (last week 0). In the 12-week period since the approximate date of seasonal low weekly incidence (March 15), 390 cases have been reported, as compared with 725 for the corresponding period last year and a 5-year median of 357. Of these 390 cases, 292 occurred in the 11 States which have reported 10 or more cases each during the period, as follows (last year's corresponding figures in parentheses): California 124 (78), New York 35 (45), Texas 34 (129), Florida 20 (153), Illinois 15 (22), Nebraska 12 (0), North Dakota 11 (1), Kentucky 11 (5), Michigan 10 (3), Missouri 10 (6), Louisiana 10 (29).

Only 2 cases of smallpox were reported for the current week—1 each in Indiana and Alabama. The total to date this year is 136, as compared with 238 for the same period last year and a 5-year median of 251.

Of 79 cases of typhoid and paratyphoid fever (last week 61, corresponding week last year 88), Texas reported 13, Illinois and Virginia 8 each, and California 6. The total for the year to date is 1,164, as compared with 1,268 for the same period last year and a 5-year median of 1,425.

Cumulative figures to date are considerably above the respective expectancies for dysentery (all forms), 12,540 (5-year median, 9,370); tularemia, 709 (5-year median, 400); undulant fever 2,429 (2-year average, 2,018); and whooping cough 66,958 (5-year median, 57,437).

Deaths recorded for the week in 93 large cities of the United States totaled 9,160, as compared with 8,130 last week (next preceding week, 8,923), 9,171 and 8,890, respectively, for the corresponding weeks of 1946 and 1945, and a 3-year (1944–46) median of 8,890. The total for the year to date is 224,658, as compared with 222,588 for the corresponding period last year.

Telegraphic morbidity reports from State health officers for the week ended June 7, 1947, and comparison with corresponding week of 1946 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median	Week ended—		Median	Week ended—		Median	Week ended—		Median
	June 7, 1947	June 8, 1946	1942–46	June 7, 1947	June 8, 1946	1942–46	June 7, 1947	June 8, 1946	1942–46	June 7, 1947	June 8, 1946	1942–46
NEW ENGLAND												
Maine	4	3	0	-------	-------	-------	50	203	139	0	0	1
New Hampshire	0	0	0	-------	1	-------	1	57	5	0	0	0
Vermont	0	0	0	-------	-------	-------	143	182	163	0	2	0
Massachusetts	8	1	2	-------	-------	-------	371	2,596	877	1	1	7
Rhode Island	0	0	0	-------	-------	-------	203	138	81	1	0	1
Connecticut	0	0	1	-------	1	1	1,011	636	342	0	1	1
MIDDLE ATLANTIC												
New York	9	29	8	[1] 1	[1] 2	[1] 2	711	3,745	1,268	7	14	21
New Jersey	5	4	4	5	3	2	573	3,575	713	2	6	6
Pennsylvania	9	11	11	([2])	([2])	([2])	285	1,639	715	4	5	13
EAST NORTH CENTRAL												
Ohio	9	6	4	5	3	3	799	888	315	2	5	14
Indiana	0	2	2	8	3	3	94	192	73	0	1	1
Illinois	3	11	11	6	7	7	340	585	401	12	5	10
Michigan [3]	5	6	6	-------	1	1	156	785	461	2	4	5
Wisconsin	0	3	1	9	22	21	618	1,776	1,431	5	3	3
WEST NORTH CENTRAL												
Minnesota	4	5	1	-------	-------	-------	714	93	309	1	1	1
Iowa	1	3	3	-------	-------	-------	381	244	105	0	0	0
Missouri	3	0	0	1	1	1	134	108	108	2	4	6
North Dakota	2	1	1	-------	-------	1	65	16	19	2	0	0
South Dakota	0	0	1	-------	-------	-------	39	12	12	0	0	0
Nebraska	1	0	2	-------	-------	-------	17	152	105	0	0	0
Kansas	4	13	3	8	2	-------	15	215	177	0	1	1
SOUTH ATLANTIC												
Delaware	0	0	0	-------	-------	-------	-------	24	10	0	3	0
Maryland [3]	7	13	6	2	-------	1	37	717	204	0	1	8
District of Columbia	0	1	1	1	-------	-------	7	137	60	0	0	1
Virginia	3	4	3	123	71	71	288	653	219	2	2	3
West Virginia	2	1	1	6	-------	-------	27	150	33	1	3	2
North Carolina	3	16	4	-------	-------	2	114	287	262	1	1	2
South Carolina	4	3	3	109	136	89	61	378	77	0	0	1
Georgia	1	2	3	1	7	6	62	64	37	1	1	2
Florida	1	5	2	5	2	2	95	93	71	0	1	1
EAST SOUTH CENTRAL												
Kentucky	8	5	2	-------	-------	-------	8	71	42	2	0	1
Tennessee	8	1	2	10	9	11	37	186	77	3	2	6
Alabama	0	5	2	8	23	18	110	157	71	1	3	2
Mississippi [3]	3	6	4	-------	-------	-------	11	-------	-------	0	4	3
WEST SOUTH CENTRAL												
Arkansas	5	1	4	9	21	12	39	131	68	0	0	0
Louisiana	3	0	1	6	1	1	27	34	34	1	0	0
Oklahoma	3	1	2	69	13	23	2	94	38	0	3	2
Texas	20	24	24	234	250	287	205	1,000	271	2	3	3
MOUNTAIN												
Montana	0	0	0	-------	-------	3	76	153	110	0	1	0
Idaho	0	1	0	5	8	2	19	58	29	0	0	0
Wyoming	1	0	0	-------	-------	-------	8	19	10	0	0	0
Colorado	3	4	8	4	3	22	36	303	151	1	0	0
New Mexico	1	1	1	5	1	1	75	61	12	0	0	0
Arizona	1	3	1	27	32	33	33	138	64	0	0	1
Utah [3]	0	0	0	2	-------	-------	107	212	212	0	0	1
Nevada	0	0	0	-------	-------	-------	1	1	4	0	0	0
PACIFIC												
Washington	1	6	4	-------	-------	1	28	116	223	0	0	2
Oregon	0	1	1	2	-------	7	7	205	105	1	1	1
California	7	27	17	20	8	42	312	1,762	1,762	3	11	11
Total	152	229	178	691	637	676	8,585	25,041	14,662	60	93	143
23 weeks	5,709	7,725	5,897	297,631	186,516	76,675	150,998	567,487	466,940	1,942	3,701	5,020
Seasonal low week [4]	(27th) July 5–11			(30th) July 26–Aug. 1			(35th) Aug. 30–Sept. 5			(37th) Sept. 13–19		
Total since low	13,275	19,369	14,743	330,606	548,764	112,537	173,885	593,611	504,953	2,914	5,205	7,472

[1] New York City only. [2] Philadelphia only.
[3] Period ended earlier than Saturday.
[4] Dates between which the approximate low week ends. The specific date will vary from year to year.

Telegraphic morbidity reports from State health officers for the week ended June 7, 1947, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever [5]		
	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46
	June 7, 1947	June 8, 1946		June 7, 1947	June 8, 1946		June 7, 1947	June 8, 1946		June 7, 1947 [5]	June 8, 1946	
NEW ENGLAND												
Maine	0	0	0	10	18	18	0	0	0	0	1	0
New Hampshire	0	0	0	8	17	9	0	0	0	0	0	0
Vermont	0	0	0	1	3	5	0	0	0	0	1	0
Massachusetts	1	0	0	72	112	251	0	0	0	0	0	4
Rhode Island	0	0	0	14	3	5	0	0	0	1	0	0
Connecticut	0	1	1	31	28	43	0	0	0	0	0	1
MIDDLE ATLANTIC												
New York	4	6	5	266	398	344	0	0	0	1	4	6
New Jersey	1	0	0	71	155	112	0	0	0	3	1	1
Pennsylvania	0	3	0	142	209	210	0	0	0	4	5	5
EAST NORTH CENTRAL												
Ohio	0	4	1	179	224	224	0	0	1	1	1	3
Indiana	0	1	1	40	37	54	1	0	0	1	3	1
Illinois	1	4	2	79	173	146	0	1	0	8	2	2
Michigan [3]	[6] 0	0	0	77	115	178	0	0	0	3	2	2
Wisconsin	0	0	0	55	76	151	0	0	0	0	0	1
WEST NORTH CENTRAL												
Minnesota	0	3	0	46	45	45	0	0	0	0	0	0
Iowa	1	1	0	8	33	28	0	1	0	0	0	0
Missouri	2	2	0	39	12	37	0	0	0	1	1	1
North Dakota	2	0	0	4	0	6	0	0	0	0	1	0
South Dakota	0	0	0	0	8	8	0	0	0	0	0	0
Nebraska	3	0	0	13	9	17	0	0	0	1	0	0
Kansas	0	7	0	14	23	24	0	1	0	0	0	1
SOUTH ATLANTIC												
Delaware	0	0	0	4	0	3	0	0	0	0	0	0
Maryland [3]	1	0	0	15	68	68	0	0	0	1	1	1
District of Columbia	1	0	0	13	13	13	0	0	0	0	0	0
Virginia	2	0	0	18	43	32	0	0	0	8	2	3
West Virginia	0	1	0	8	20	20	0	0	0	0	1	2
North Carolina	0	2	1	16	16	16	0	0	0	3	1	1
South Carolina	0	3	1	0	11	4	0	0	0	2	10	1
Georgia	0	1	0	2	7	9	0	0	0	3	5	5
Florida	1	33	1	1	2	2	0	0	0	1	2	4
EAST SOUTH CENTRAL												
Kentucky	2	0	0	12	16	23	0	0	0	2	6	5
Tennessee	2	3	1	18	11	24	0	0	0	4	1	3
Alabama	1	15	2	1	10	10	1	0	0	1	4	1
Mississippi [3]	0	1	1	3	5	5	0	0	0	1	0	0
WEST SOUTH CENTRAL												
Arkansas	0	1	1	3	4	4	0	0	1	4	5	5
Louisiana	0	9	3	4	5	4	0	0	0	4	4	4
Oklahoma	0	2	1	3	5	10	0	0	0	0	1	1
Texas	6	35	10	18	25	26	0	0	0	13	13	9
MOUNTAIN												
Montana	0	0	0	15	5	8	0	0	0	0	0	0
Idaho	0	0	0	2	2	7	0	0	0	0	2	0
Wyoming	0	0	0	1	10	10	0	0	0	0	0	0
Colorado	1	5	0	31	18	38	0	1	0	1	1	0
New Mexico	0	0	0	9	3	3	0	0	0	0	1	1
Arizona	0	1	0	7	4	8	0	0	0	0	1	1
Utah [3]	0	0	0	11	17	17	0	0	0	0	0	0
Nevada	0	0	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	1	1	1	26	19	20	0	0	0	0	0	0
Oregon	2	0	0	24	26	17	0	0	1	1	0	0
California	13	15	13	112	150	173	0	0	0	6	5	5
Total	48	160	60	1,555	2,213	2,294	2	4	6	79	88	104
23 weeks	[6] 1,000	1,193	659	55,740	77,487	87,636	136	238	251	1,164	1,268	1,425
Seasonal low week [4]	(11th) Mar. 15–21			(32d) Aug. 9–15			(35th) Aug. 30–Sept. 5			(11th) Mar. 15–21		
Total since low	390	725	357	82,426	116,058	125,957	190	314	368	679	793	840

[3] Period ended earlier than Saturday.
[4] Dates between which the approximate low week ends. The specific date will vary from year to year.
[5] Including paratyphoid fever reported separately, as follows: Indiana 1; Maryland 1; Virginia 2; Georgia 2; Texas 6; California 2.
[6] Correction: 17 of the 18 cases of poliomyelitis reported in Michigan for the week ended January 4 have been deducted from the previous totals, as they are stated to have been delayed reports of cases occurring in 1946.

Telegraphic morbidity reports from State health officers for the week ended June 7, 1947, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Whooping cough: Week ended— June 7, 1947	Whooping cough: Week ended— June 8, 1946	Whooping cough: Median 1942–46	Week ended June 7, 1947: Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis, infectious	Rocky Mt. spotted fever	Tularemia	Typhus fever, endemic	Undulant fever
NEW ENGLAND											
Maine	20	19	32								1
New Hampshire		5	2								
Vermont	3	38	32								6
Massachusetts	137	100	132	1	4						4
Rhode Island	39	28	28				1				
Connecticut	57	65	53		1						3
MIDDLE ATLANTIC											
New York	240	145	210	11	11		1			1	10
New Jersey	256	184	167					1			4
Pennsylvania	152	63	166					2			
EAST NORTH CENTRAL											
Ohio	171	72	128					1			2
Indiana	40	46	34					4			
Illinois	89	97	97	10			2	1	2		10
Michigan [3]	96	71	81	1							8
Wisconsin	134	100	100								4
WEST NORTH CENTRAL											
Minnesota	28	9	20						1		3
Iowa	126	14	11								
Missouri	50	13	20						1		1
North Dakota	1		3			1					
South Dakota	1							1			18
Nebraska	26	1	2								
Kansas	49	26	31						3		8
SOUTH ATLANTIC											
Delaware	2	1	1								
Maryland [3]	58	26	45			1		2			
District of Columbia	8	6	6								
Virginia	87	76	76			262	1	2			2
West Virginia	27	17	17					2			
North Carolina	98	108	158		1			1	2		
South Carolina	130	67	75	5	10					1	1
Georgia	39	5	21		1					2	11
Florida	41	27	19	1							3
EAST SOUTH CENTRAL											
Kentucky	36	33	55					2			
Tennessee	65	25	33			2			4		2
Alabama	42	45	45							4	1
Mississippi [3]	8								1	1	8
WEST SOUTH CENTRAL											
Arkansas	77		26	3		2			10		3
Louisiana	10		5	15	5				2	1	2
Oklahoma	39	8	9			1	1		1		
Texas	689	180	230	6	209	25			1	19	11
MOUNTAIN											
Montana	10	1	4					1			
Idaho	15	14	1								
Wyoming	1		2					1			
Colorado	36	19	25					1			1
New Mexico	23	10	7			2					
Arizona	20	17	11	1		16					
Utah [3]	13	12	42								1
Nevada											
PACIFIC											
Washington	15	29	29								2
Oregon	24	20	20			3					
California	310	44	274	2	1		2			2	6
Total	3,647	1,886	2,679	56	333	315	8	22	28	31	136
Same week, 1946	1,886			39	385	207	7	17	8	52	113
Median, 1942–46	2,679			39	385	172	13	18	18	52	[7] 104
23 weeks: 1947	66,958			1,122	6,861	4,557	152	104	709	835	2,429
1946	42,905			897	7,597	2,710	200	105	400	1,067	1,973
Median, 1942–46	57,437			721	6,740	1,909	201	105	400	1,067	[7] 2,018

[3] Period ended earlier than Saturday.
[7] 2-year average, 1945–46.

Anthrax: New York 1 case. *Leprosy*: Louisiana 1 case.
Alaska, week ended June 7: Chickenpox 6; measles 1.

WEEKLY REPORTS FROM CITIES [1]

City reports for week ended May 31, 1947

This table lists the reports from 88 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0	1	0	31	1	1	0	3	0	0	7
New Hampshire:												
Concord	0	0	-----	0	-----	0	0	0	3	0	0	-----
Vermont:												
Barre	0	0	-----	0	3	0	1	0	0	0	0	-----
Massachusetts:												
Boston	5	0	-----	0	57	0	6	0	5	0	0	23
Fall River	0	0	-----	0	13	0	0	0	2	0	0	1
Springfield	0	0	-----	0	25	0	0	0	0	0	0	-----
Worcester	0	0	-----	0	23	0	7	0	3	0	0	13
Rhode Island:			-----									
Providence	0	0		0	84	0	0	0	6	0	0	19
Connecticut:												
Bridgeport	0	0	-----	0	53	0	3	0	1	0	0	3
Hartford	0	0	-----	0	59	0	1	0	1	0	0	-----
New Haven	0	0	-----	0	88	0	0	0	5	0	0	11
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0	-----	0	-----	1	4	0	5	0	0	1
New York	9	0	5	3	433	2	57	0	71	0	1	70
Rochester	1	0	-----	0	-----	0	5	0	10	0	0	9
Syracuse	0	0	-----	0	-----	0	0	0	10	0	0	15
New Jersey:												
Camden	0	0	-----	0	-----	0	1	0	2	0	0	1
Newark	0	0	-----	0	6	0	2	0	11	0	1	53
Trenton	0	0	-----	0	11	0	3	0	3	0	0	-----
Pennsylvania:												
Philadelphia	3	0	1	0	32	1	15	0	25	0	0	34
Pittsburgh	0	0	-----	0	11	1	4	0	6	0	0	8
Reading	0	0	-----	0	1	0	0	0	4	0	0	-----
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	1	0	-----	0	2	0	8	0	6	0	0	2
Cleveland	1	0	1	1	130	1	6	0	35	0	0	46
Columbus	0	0	-----	0	169	0	3	0	7	0	0	-----
Indiana:												
Fort Wayne	0	0	-----	0	1	0	1	0	0	0	0	-----
Indianapolis	0	0	-----	0	3	0	0	0	10	0	0	14
South Bend	0	0	-----	0	27	0	0	0	3	0	0	1
Terre Haute	0	0	-----	0	-----	0	1	0	3	0		1
Illinois:												
Chicago	0	0	-----	0	37	2	19	0	26	0	0	31
Springfield	1	0	-----	0	-----	0	2	0	1	0	0	-----
Michigan:												
Detroit	0	0	-----	0	1	0	13	0	33	0	0	78
Flint	0	0	-----	0	-----	0	1	0	2	0	0	-----
Grand Rapids	0	0	-----	0	8	0	2	0	10	0	0	8
Wisconsin:												
Kenosha	0	0	-----	0	-----	0	0	0	0	0	0	-----
Milwaukee	0	0	-----	0	32	1	4	0	6	0	0	31
Racine	0	0	-----	0	1	0	1	0	15	0	0	7
Superior	0	0	-----	0	-----	0	0	0	1	0	0	-----
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0	-----	0	1	0	0	0	3	0	0	1
Minneapolis	1	0	-----	2	32	0	2	0	13	0	0	6
St. Paul	0	0	-----	0	533	0	3	0	4	0	0	27
Missouri:												
Kansas City	0	0	-----	0	1	0	0	0	5	0	0	7
St. Joseph	0	0	-----	0	1	0	0	0	0	0	0	3
St. Louis	1	0	-----	1	40	0	2	0	10	0	0	23

[1] In some instances the figures include nonresident cases.

City reports for week ended May 31, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
Nebraska:												
Omaha	1	0	------	0	4	0	1	0	4	0	0	------
Kansas:												
Topeka	0	0	------	0	1	0	1	0	8	0	0	------
Wichita	0	0	------	0	------	0	1	0	1	0	1	6
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0	------	0	------	0	1	0	0	0	0	1
Maryland:												
Baltimore	3	0	1	1	27	0	2	0	9	0	0	82
Cumberland	0	0	------	0	------	0	1	0	0	0	0	------
Frederick	0	0	------	0	------	0	0	0	0	0	0	------
District of Columbia:												
Washington	0	0	------	0	10	1	5	0	4	0	0	22
Virginia:												
Lynchburg	0	0	------	0	1	0	1	0	0	0	0	1
Richmond	0	0	------	0	74	0	2	0	2	0	0	1
Roanoke	0	0	------	0	16	0	0	0	0	0	0	1
West Virginia:												
Wheeling	0	0	------	0	------	0	1	0	0	0	0	------
North Carolina:												
Raleigh	0	0	------	0	2	0	1	0	0	0	0	3
Wilmington	0	0	------	0	2	0	0	0	0	0	0	------
Winston Salem	0	0	------	0	11	0	0	0	0	0	0	------
South Carolina:												
Charleston	0	0	4	0	4	0	1	0	0	0	0	7
Georgia:												
Atlanta	0	0	------	0	9	0	0	0	0	0	0	------
Brunswick	0	0	------	0	------	0	0	0	0	0	0	------
Savannah	0	0	------	0	------	0	0	0	0	0	0	2
Florida:												
Tampa	1	0	------	0	1	0	1	0	0	0	0	5
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	0	0	------	0	6	1	7	0	2	0	0	24
Nashville	0	0	------	0	------	0	1	0	3	0	0	6
Alabama:												
Birmingham	0	0	5	1	6	0	3	0	0	0	0	6
Mobile	2	0	1	1	6	0	0	0	0	0	0	1
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	------	0	------	0	0	0	0	0	0	3
Louisiana:												
New Orleans	1	0	2	0	34	0	3	0	4	0	0	6
Shreveport	1	0	------	0	------	0	2	0	1	0	0	------
Oklahoma:												
Oklahoma City	0	0	------	0	------	0	0	0	0	0	0	------
Texas:												
Dallas	1	0	------	0	107	0	2	0	1	0	0	7
Galveston	0	0	------	0	------	0	1	0	0	0	0	------
Houston	0	0	------	0	2	0	5	0	0	0	0	1
San Antonio	0	0	------	0	1	0	2	1	0	0	0	5
MOUNTAIN												
Montana:												
Billings	0	0	------	0	------	0	0	0	0	0	0	------
Great Falls	0	0	------	0	3	0	0	0	2	0	0	4
Helena	0	0	------	0	1	0	0	0	0	0	0	------
Missoula	0	0	------	0	3	0	1	0	0	0	0	------
Colorado:												
Denver	2	0	1	0	9	0	2	0	11	0	0	15
Pueblo	0	0	------	0	------	0	1	0	0	0	0	9
Utah:												
Salt Lake City	0	0	------	0	------	0	1	0	1	0	0	6

City reports for week ended May 31, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infections, cases	Influenza Cases	Influenza Deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
PACIFIC												
Washington:												
Seattle	1	0	------	0	4	0	1	0	5	0	0	8
Spokane	0	0	------	0	------	0	0	0	3	0	0	5
Tacoma	0	0	------	0	------	0	0	0	0	0	0	------
California:												
Los Angeles	3	0	2	1	5	1	3	6	22	0	0	31
Sacramento	0	0	------	0	1	0	0	0	1	0	0	7
San Francisco	2	0	1	0	8	0	7	1	3	0	0	3
Total	41	0	25	11	2,307	13	234	8	456	0	3	832
Corresponding week, 1946*	70	------	18	13	5,775	------	270	------	752	0	13	441
Average 1942–46*	61	------	36	[2] 12	[3] 4,888	------	[2] 280	------	1,068	1	15	785

[2] 3-year average, 1944–46.
[3] 5-year median, 1942–46.
*Exclusive of Oklahoma City.
Anthrax.—Cases: Philadelphia 1.
Dysentery, amebic.—Cases: New York 4; Chicago 2; Detroit 1; Baltimore 1; New Orleans 4; San Francisco 1.
Dysentery, bacillary.—Cases: New York 1; Charleston, S. C., 4; New Orleans 1; San Antonio 1.
Dysentery, unspecified.—Cases: Indianapolis 1; San Antonio 3.
Rocky Mt. spotted fever.—Cases: Philadelphia 1.
Typhus fever, endemic.—Cases: Los Angeles 1.

Rates (annual basis) per 100,000 population, by geographic groups, for the 88 cities in the preceding table (latest available estimated population, 34,500,700)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza Case rates	Influenza Death rates	Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
New England	13.1	0.0	2.6	0.0	1,140	2.6	49.7	0.0	76	0.0	0.0	201
Middle Atlantic	6.0	0.0	2.8	1.4	229	2.3	42.1	0.0	68	0.0	0.9	88
East North Central	1.8	0.0	0.6	0.6	250	2.4	34.1	0.0	96	0.0	0.0	133
West North Central	6.0	0.0	0.0	6.0	1,233	0.0	20.1	0.0	97	0.0	2.0	147
South Atlantic	6.7	0.0	8.4	1.7	263	1.7	26.8	0.0	25	0.0	0.0	209
East South Central	11.8	0.0	35.4	11.8	106	5.9	64.9	0.0	30	0.0	0.0	218
West South Central	7.6	0.0	5.1	0.0	366	0.0	38.1	2.5	15	0.0	0.0	56
Mountain	16.5	0.0	8.3	0.0	132	0.0	41.3	0.0	116	0.0	0.0	281
Pacific	9.5	0.0	4.7	1.6	28	1.6	17.4	11.1	54	0.0	0.0	85
Total	6.2	0.0	3.8	1.7	350	2.0	35.5	1.2	69	0.0	0.5	126

Puerto Rico

Notifiable diseases—5 weeks ended May 3, 1947.—During the 5 weeks ended May 3, 1947, cases of certain notifiable diseases were reported in Puerto Rico as follows:

Disease	Cases	Disease	Cases
Chickenpox	92	Syphilis	221
Diphtheria	52	Tetanus	18
Dysentery, unspecified	9	Tetanus, infantile	2
Gonorrhea	241	Tuberculosis (all forms)	919
Influenza	141	Typhoid and paratyphoid fever	16
Malaria	204	Typhus fever (murine)	7
Measles	9	Whooping cough	65
Poliomyelitis	2		

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended May 17, 1947.—During the week ended May 17, 1947, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		19		142	266	30	40	33	25	555
Diphtheria		1		23	1		3			28
Dysentery, bacillary				3						3
Encephalitis, infectious							1			1
German measles				50	55	6	6	5	9	131
Influenza		3			7	10			26	46
Measles	66	32	5	70	252	248	36	100	112	921
Meningitis, meningococcus					1			1		2
Mumps		28		52	360	25	42	10	121	638
Poliomyelitis			1							1
Scarlet fever		1	4	42	95	3	2	7		154
Tuberculosis (all forms)		6	10	105	41	30	20	33	40	285
Typhoid and paratyphoid fever		1	1	5	2				4	13
Undulant fever				6	3					9
Venereal diseases:										
Gonorrhea		9	10	42	95	(1)	34	37	77	304
Syphilis		16	1	147	52	(1)	4	12	40	272
Other forms						(1)			4	4
Whooping cough			1	10	146	30		8	31	226

[1] Report from Manitoba for the current period not received.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From consular reports, international health organizations, medical officers of the Public Health Service, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

[C indicates cases]

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place		January–March 1947	April 1947	May 1947—week ended— 3	10	17	24	31
ASIA								
Burma	C	93	25	10	2	29		
Moulmein	C	12	10	4	2	7		
China: Formosa (Island of)	C	14						
India	C	14,848	13,810					
Calcutta	C	[1] 815	1,359	232	[1] 158	[1] 141		
Cawnpore	C	6	2	1	1	1	1	
Chittagong	C	[2] 1	[2] 1	[1] 2	2		[2] 1	
Lucknow	C	2	1					
Madras	C	2						
India (French)	C	41	3					

[1] Includes imported cases. [2] Imported.

CHOLERA—Continued

Place		January—March 1947	April 1947	May 1947—week ended—				
				3	10	17	24	31
Indochina (French):								
Cambodia	C	230			[3] 17			
Cochinchina	C	124	50					[4] 71
Bien Hoa	C		1					
Cholon	C	14	8				[5] 8	
Giadinh	C	11						
Longxuyen	C	6						
Mytho	C		3					
Rachgia	C	11	7				[5] 1	
Saigon	C	78	19	12	6	7	6	
Vinh-long	C	4	3					
Siam (Thailand)	C	1,522	200	33		20	3	
Bangkok	C	838	176	33		20	3	

[3] For the period May 1–10, 1947.
[4] For the period May 1–20, 1947.
[5] For the period May 11–20, 1947.

PLAGUE

[C indicates cases]

Place		January—March 1947	April 1947	3	10	17	24	31
AFRICA								
Belgian Congo	C	[1] 5	4					
British East Africa:								
Kenya	C	12	10					
Uganda	C	1						
Egypt: Alexandria	C			2				
Madagascar	C	139	12					
Union of South Africa	C	19						
ASIA								
Burma	C	1,124	26	1	1	2		
Bassein	C	[2] 2						
Mandalay	C	17						
Rangoon	C	8	4					
China.								
Chekiang Province	C	13						
Fukien Province	C	255	6					
Amoy	C		6					
Kiangsi Province	C	19	24					
Nanchang	C	7	22					
Kiangsu Province: Shanghai	C	28						
Kwangtung Province	C	1						
Yunnan Province	C	16						
India	C	50,131	14,521					
Indochina (French):								
Annam	C	3	14		[3] 3			
Cochinchina	C	3			[3] 6			
Java	C	[4] 33	3					
Palestine	C	1						
Siam (Thailand)	C	31						
Syria	C		6					
Turkey: Akcakale	C	5	13					
EUROPE								
Portugal: Azores	C	1						
Turkey (see Turkey in Asia).								
SOUTH AMERICA								
Argentina: Santa Fe Province	C	2						
Ecuador:								
Chimborazo Province	C	2						
Loja Province	C	2						
Peru:								
Lambayeque Department	C		4					
Libertad Department	C	8						
Lima Department	C	12						
Piura Department	C	58	19					
OCEANIA								
Hawaii Territory: Plague infected rats [5]		1						

[1] Includes 4 cases of pneumonic plague.
[2] Imported.
[3] For the period May 1–10, 1947.
[4] Includes imported cases.
[5] Plague infection was also reported in Hawaii Territory as follows: On Jan. 9, 1947, in a pool of 31 rats; on Mar. 20, 1947, in a pool of 32 fleas collected from 59 rats.

SMALLPOX

[C indicates cases; P, present]

Place		January–March 1947	April 1947	May 1947—week ended—				
				3	10	17	24	31
AFRICA								
Algeria	C	85						
Basutoland	C	1						
Bechuanaland	C	14						
Belgian Congo	C	[1] 306	[1] 250	37				
British East Africa:								
Kenya	C	155	63	16				
Nyasaland	C	344	79	5	10	3	7	
Tanganyika	C	711	40	21	46			
Uganda	C	99	10	5	2			
Cameroon (French)	C	15						
Dahomey	C	30	18				[2] 25	
Egypt	C	243	91	20				
Ethiopia	C	17	2					
French Equatorial Africa	C	3						
French Guinea	C	122	34					
Gambia	C		4		1			
Gold Coast	C	460	19	2	33			
Ivory Coast	C	618	195		[3] 61			
Liberia	C	35			2			
Libya	C	1,116	239	79	96	60		
Mauritania	C	22						
Morocco (French)	C	43	8		[3] 3			
Morocco (Int. Zone)	C	12						
Morocco (Spanish)	C	15						
Nigeria	C	2,110						
Niger Territory	C	994	394					
Portuguese Guinea	C	3						
Rhodesia:								
Northern	C	6						
Southern	C	[4] 4	2					
Senegal	C	10	2					
Sierra Leone	C	120	2					
Sudan (Anglo-Egyptian)	C	[1] 26	[1] 29	8		11		
Sudan (French)	C	239	26					
Swaziland	C	10						
Togo (French)	C	77	8					
Tunisia	C	450	41					
Union of South Africa	C	267	P	P	P	P		
ASIA								
Burma	C	1,639	437	79	136	78		
Ceylon	C	1						
China	C	1,286	508	128	112	152	69	
India	C	16,918	12,111					
India (French)	C	8	1					
India (Portuguese)	C	3						
Indochina (French)	C	844	211		[3] 187			
Iran	C	21	4					
Iraq	C	6			3			
Japan	C	183	61	9	25			
Korea [5]	C	95	30					
Malay States (Federated)	C	2,174	319	52				
Manchuria	C	4						
Siam (Thailand)	C	612	64	1				
Straits Settlements	C	91	4		1	1		
Syria	C	1	1					
Turkey (see Turkey in Europe).								
EUROPE								
Belgium	C		[1] 10	3				
France	C	32	3		1			
Germany	C	11	1					
Great Britain: England and Wales	C	18	15	1	2	8	6	9
Italy	C	46						
Luxemburg	C				1			
Portugal	C	7		1				
Spain	C	16	2					
Turkey	C	2						

[1] Includes alastrim.
[2] For the period May 11–20, 1947.
[3] For the period May 1–10, 1947.
[4] Includes 1 imported case.
[5] Smallpox has also been reported in Korea as follows: Nov. 1946, 45 cases; Dec. 1946, 41 cases.

SMALLPOX—Continued

Place		January—March 1947	April 1947	May 1947—week ended— 3	10	17	24	31
NORTH AMERICA								
Guatemala	C	3				2		
Mexico	C	64						
SOUTH AMERICA								
Argentina	C	2						
Brazil	C	[1] 22	2	1				
Colombia	C	565	326					
Ecuador	C	49	50					
Paraguay	C	[1] 88	[1] 11					
Peru	C	117						
Uruguay	C		[6] 183					
Venezuela	C	[1] 323	[1] 129	35	63	185	67	

[1] Includes alastrim. [6] For the period Jan. 1 to Apr. 23, 1947.

TYPHUS FEVER *

[C indicates cases; P, present]

Place		January—March 1947	April 1947	May 1947—week ended— 3	10	17	24	31
AFRICA								
Algeria	C	113						
Basutoland	C	3						
Belgian Congo	C	149	33	5				
British East Africa:								
Kenya	C	4	1					
Uganda	C	1						
Egypt	C	37	10					
Eritrea	C	291	66	15				
Ethiopia	C	31	9					
French West Africa [1]	C	2						
Gold Coast	C	2						
Libya	C	64	11	1	3	16		
Morocco (French)	C	80	11		1			
Morocco (International Zone)	C	5						
Morocco (Spanish)	C	18						
Nigeria	C	3						
Tunisia	C	174	209					
Union of South Africa	C	113	P	P	P			
ASIA								
Arabia	C		1					
Burma	C	3						
China [2]	C	30	14			1		
India	C	6						
Indochina (French): Annam	C				2			
Iran	C	87	16					
Iraq	C	56	32	8	5	4	11	
Japan	C	500	138	14	20			
Java	C	1						
Korea [3]	C	917	344					
Malay States (Federated)	C	9						
Palestine [2]	C	14	14		8	3		
Straits Settlements	C	[4] 2						
Syria	C	8	10	9	1			
Trans-Jordan	C	5	3		1			
Turkey (see Turkey in Europe).								
EUROPE								
Austria	C	1	1	1			1	
Bulgaria	C	369	27					
Czechoslovakia	C	6	5	2				
France	C	8						
Germany	C	7	1	1				
Great Britain: Malta and Gozo [1]	C	3	1					
Greece [2]	C	65	22	5	17	4	1	
Hungary	C	306	104	38	21	16	20	
Italy	C	10						
Sicily	C	7						
Netherlands	C	1						
Poland	C	204	42					
Portugal	C	1	1					
Rumania	C	6,590	3,457					

*Reports from some areas are probably murine type, while others probably include both murine and louse-borne types.

For footnotes, see page 968.

TYPHUS FEVER*—Continued

Place		January-March 1947	April 1947	May 1947—week ended—				
				3	10	17	24	31
EUROPE—continued								
Spain	C	28	30					
Switzerland [1]	C	1	1					
Turkey	C	297	45	10	8	8	5	
Yugoslavia	C	35						
NORTH AMERICA								
Costa Rica [1]	C	46	28	5	3	5		
Cuba [1]	C	2	2					
Guatemala	C	112				3		
Jamaica [1]	C	11	1		1			
Mexico	C	581						
Panama Canal Zone	C	5	1					
Panama (Republic)	C	[4] 16						
Puerto Rico [1]	C	7	6	1	2	3		
SOUTH AMERICA								
Argentina	C	6						
Brazil	C		1					
Chile [2]	C	114						
Colombia	C	424	130					
Ecuador [2]	C	152	51					
Peru	C	287						
Venezuela [2]	C	16						
OCEANIA								
Australia [1]	C	32	12					
Hawaii Territory [1]	C	9						

*Reports from some areas are probably murine type, while others probably include both murine and louse-borne types.

[1] Murine type.

[2] Includes cases of murine type.

[3] Typhus fever was also reported in Korea as follows: Nov. 1946, 93 cases; Dec. 1946, 117 cases.

[4] Includes imported cases.

YELLOW FEVER

[C indicates cases; D, deaths]

Place		January-March 1947	April 1947	May 3	May 10	May 17	May 24	May 31
SOUTH AMERICA								
Colombia:								
Antioquia Department	C	3						
Caldas Department	D	3						
Cundinamarca Department	D	2						
Santander Department	D	25						
Tolima Department	D	2						

FEDERAL SECURITY AGENCY

UNITED STATES PUBLIC HEALTH SERVICE

THOMAS PARRAN, *Surgeon General*

DIVISION OF PUBLIC HEALTH METHODS

G. ST. J PERROTT, *Chief of Division*

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